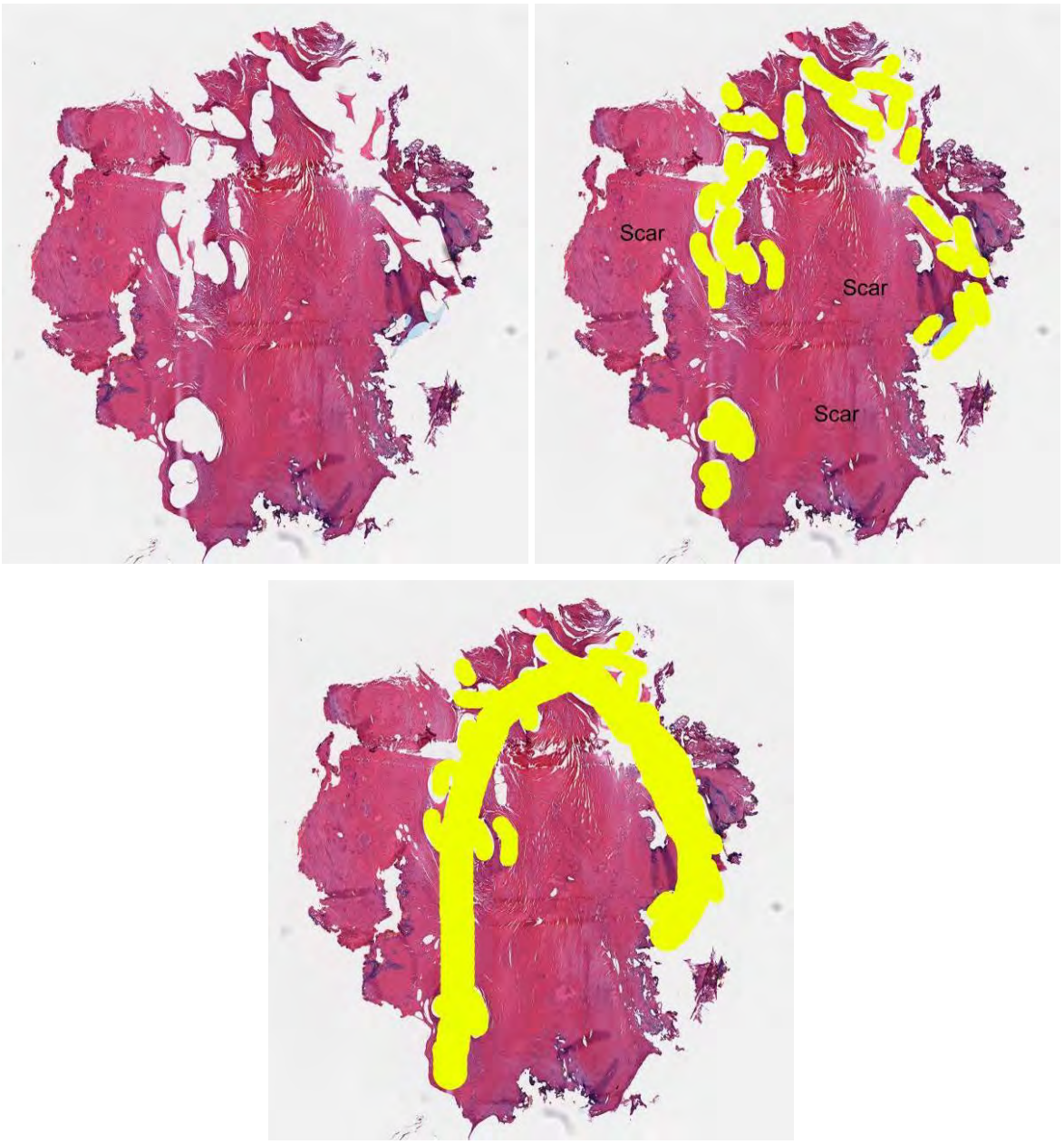



Figure set 10c. A TVT sling with curled edges, H&E, 2.5x.

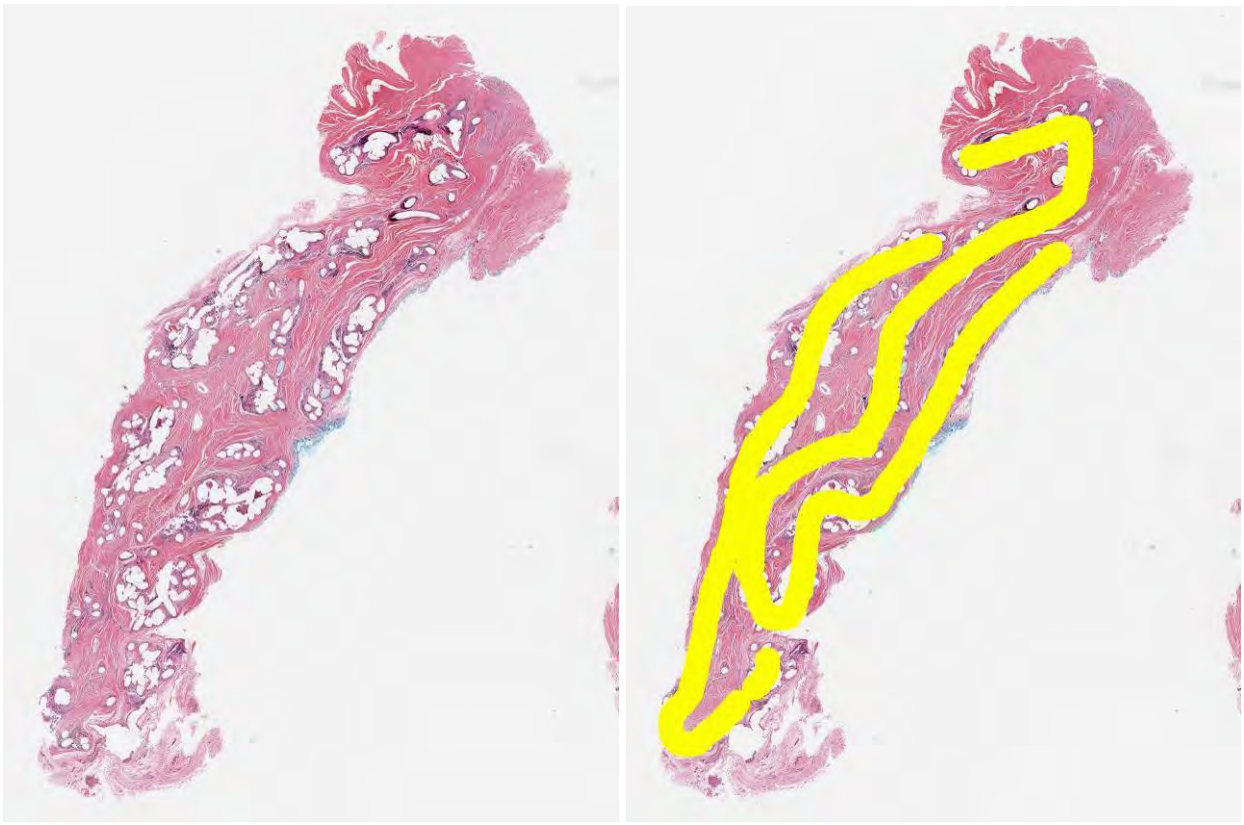


Figure set 10d. A folded pelvic organ prolapse device, H&E, 1.6x.

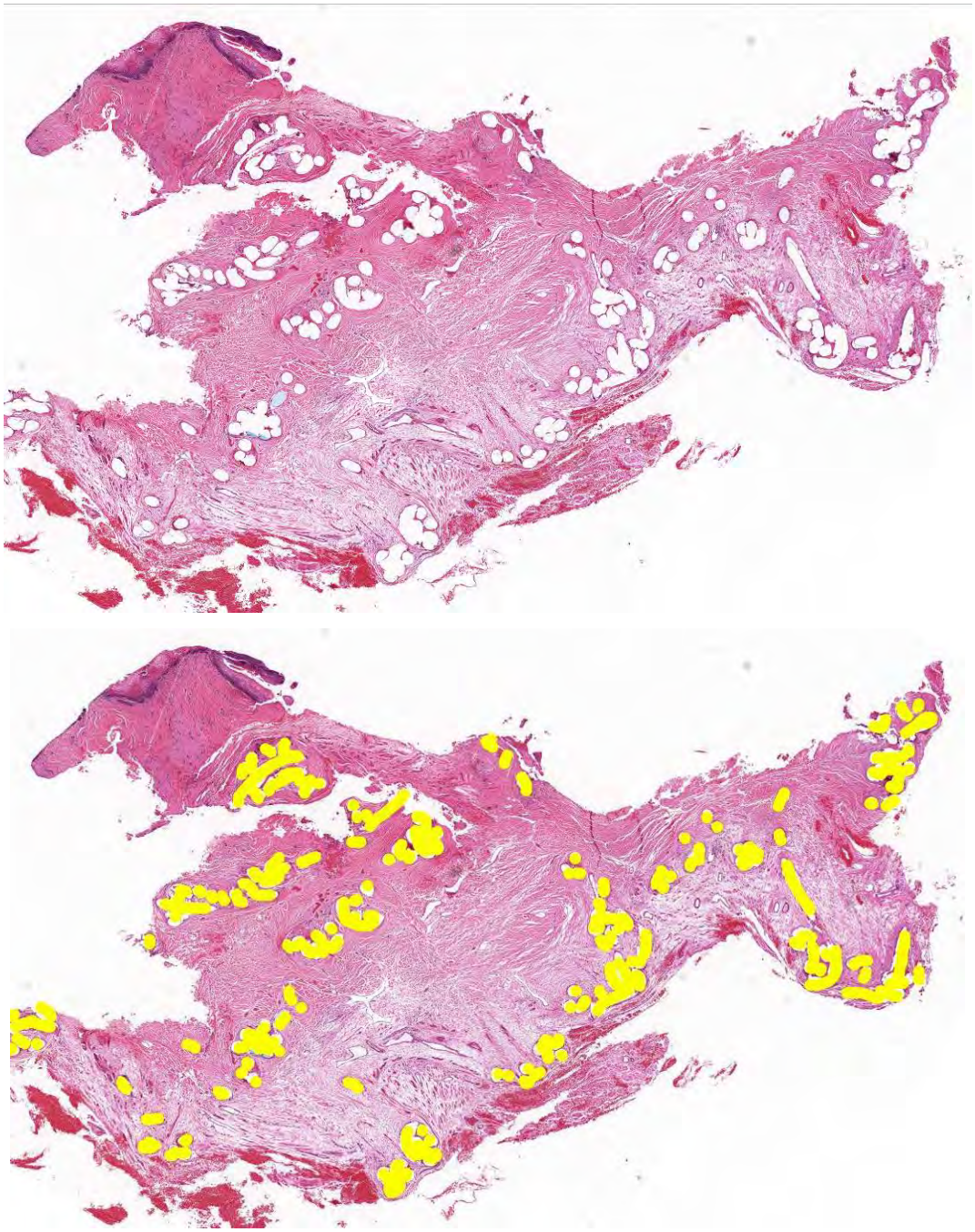


Figure set 10e. Complex folding of a Prolift pelvic organ prolapse device, H&E, 1.6x.

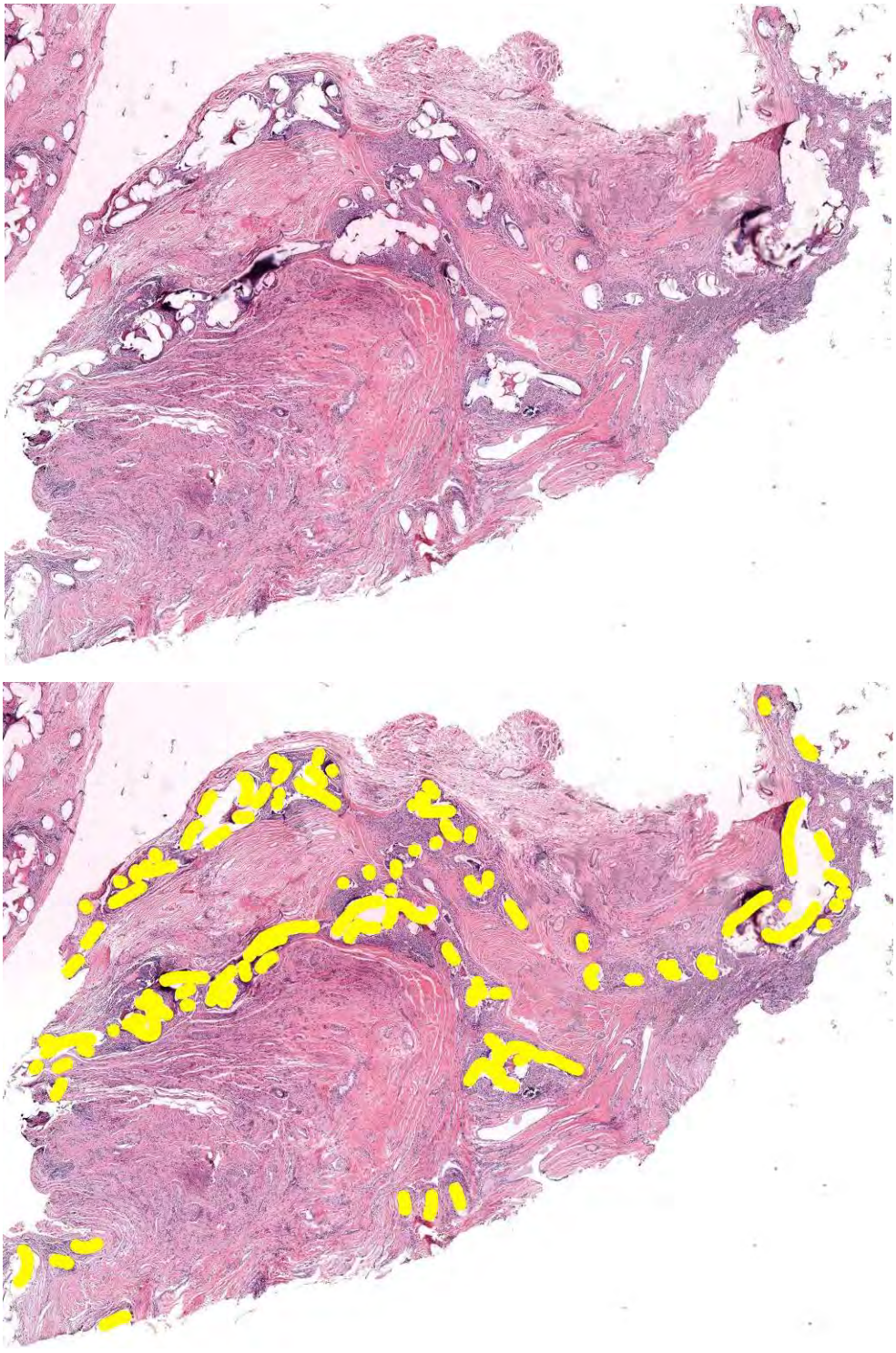


Figure set 10f. Complex folding of an exposed pelvic organ prolapse device, H&E, 1.6x.

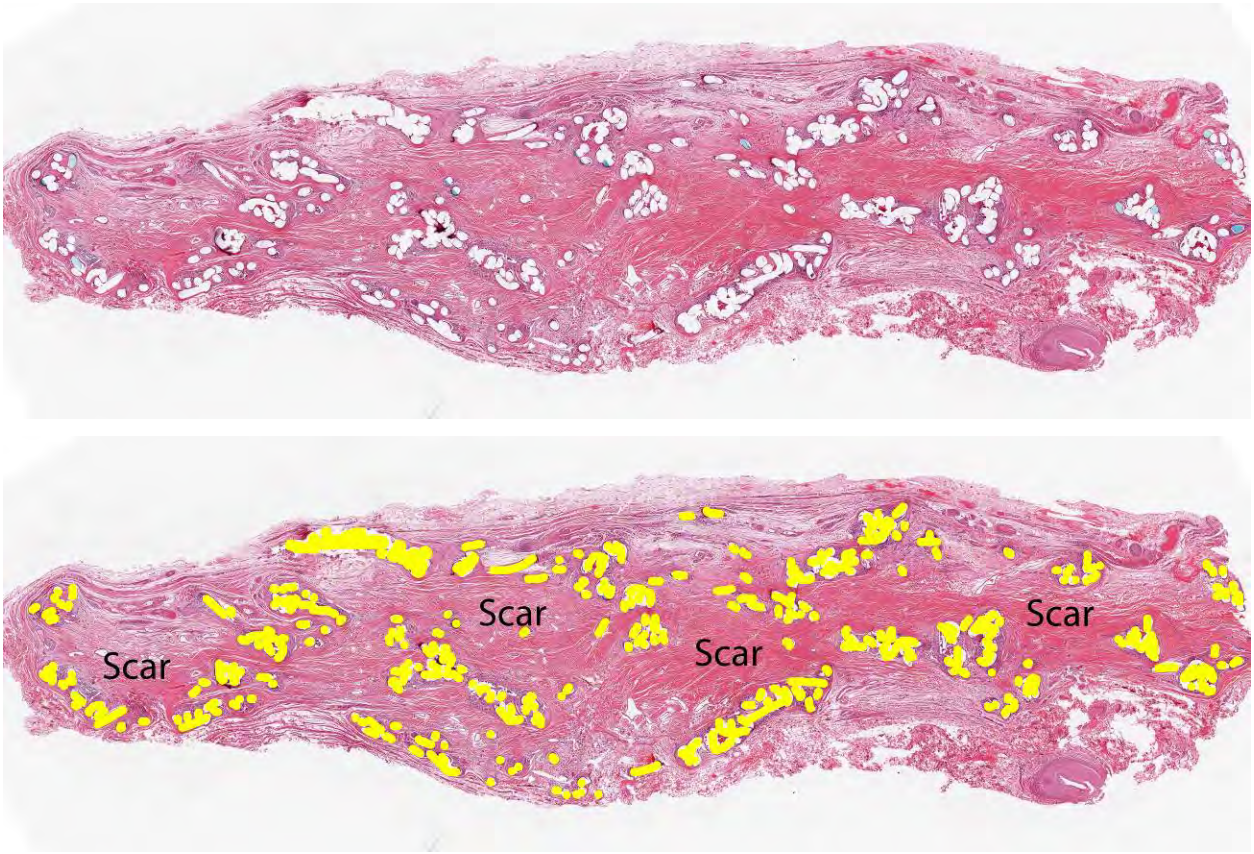



Figure set 10g. Complex folding of a Prolift pelvic organ prolapse device, H&E, 1.6x.

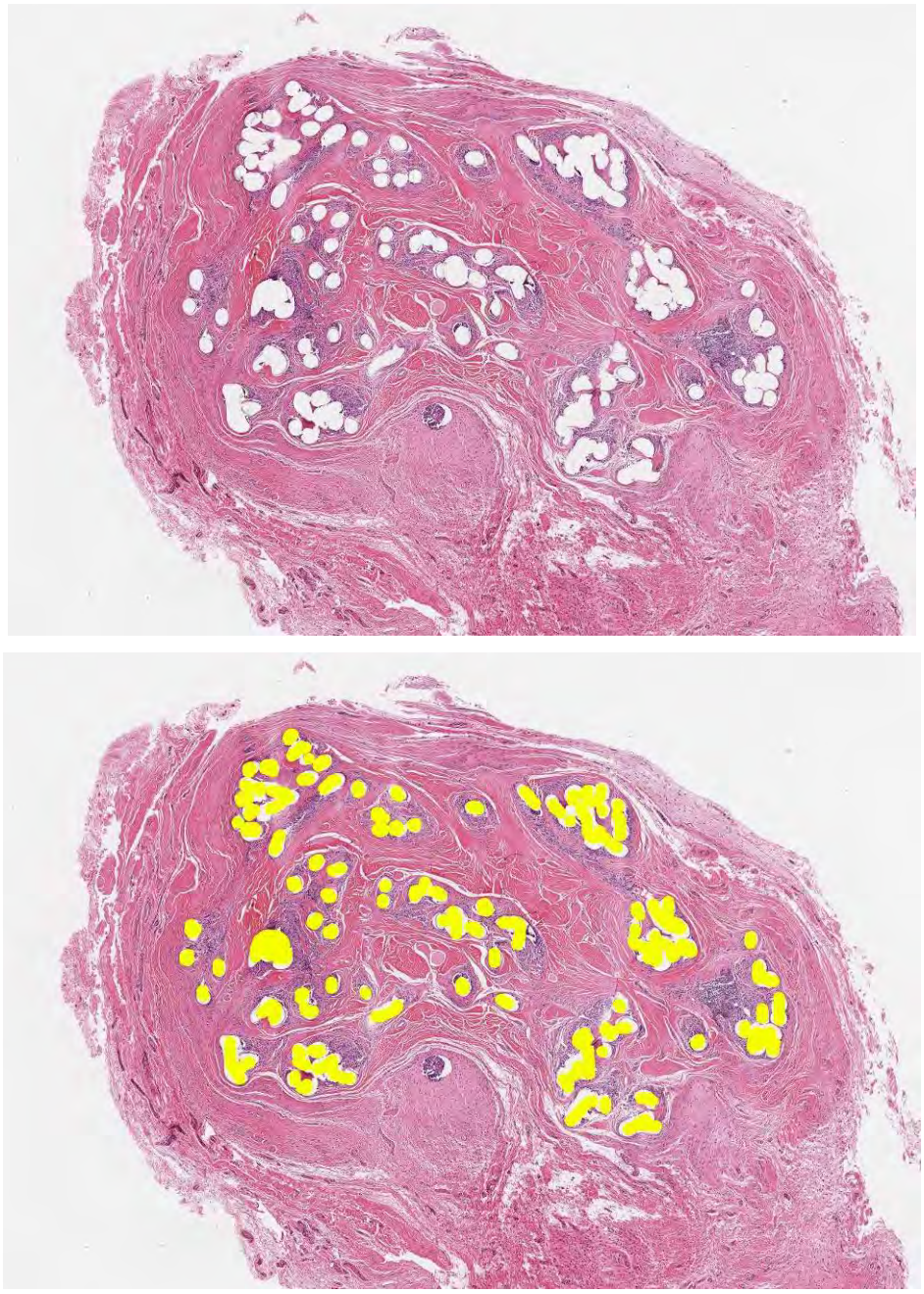


Figure set 10h. Complex folding of an arm of a Prolift pelvic organ prolapse device, H&E, 1.6x.

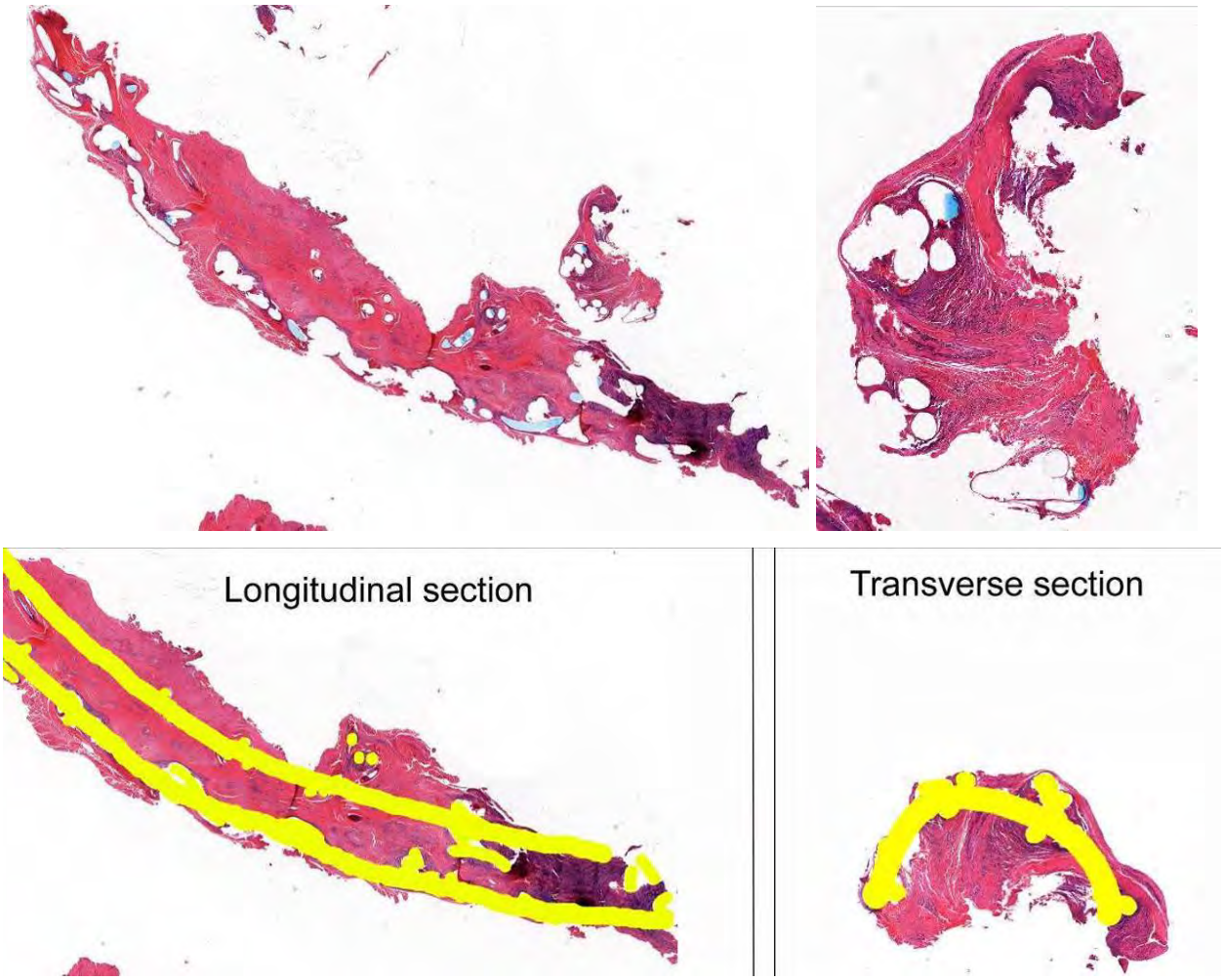



Figure set 11a. A TVT sling with an exposed curled edge, H&E, 2.5x.

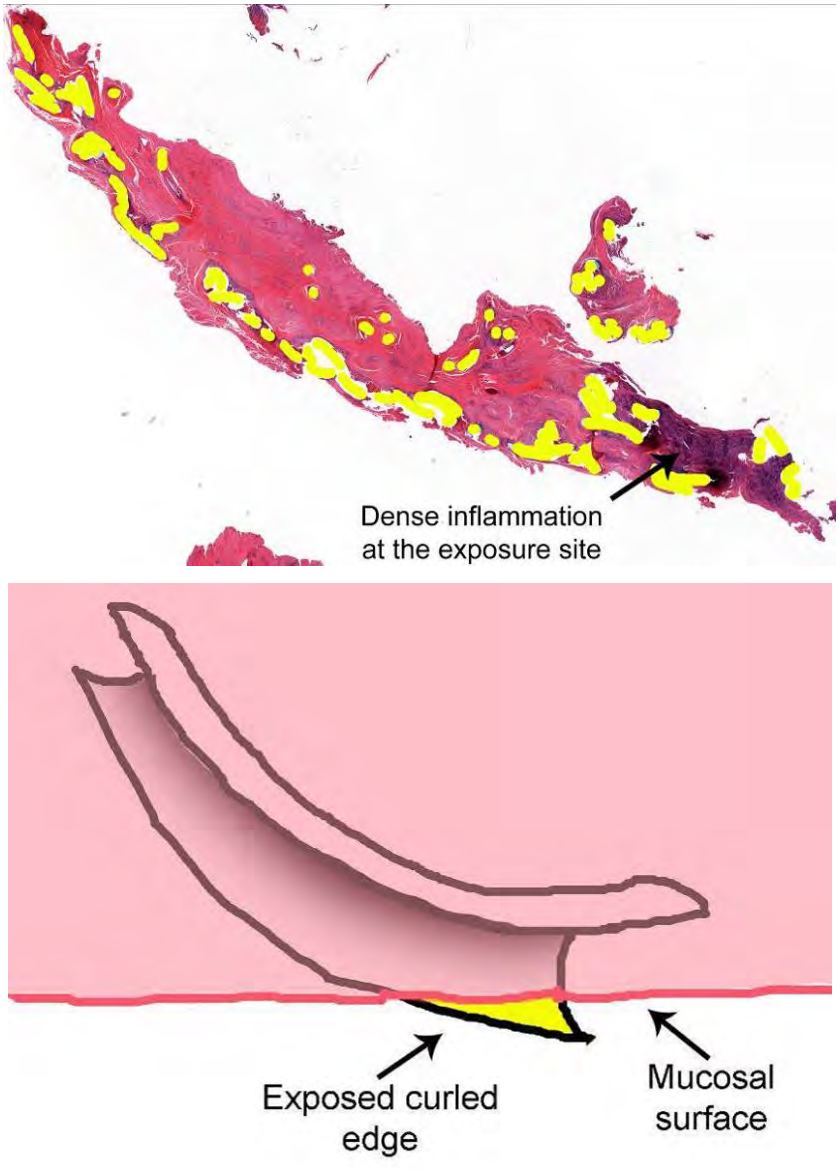



Figure set 11b. A cartoon showing the position of the exposed edge from Figure 11a.

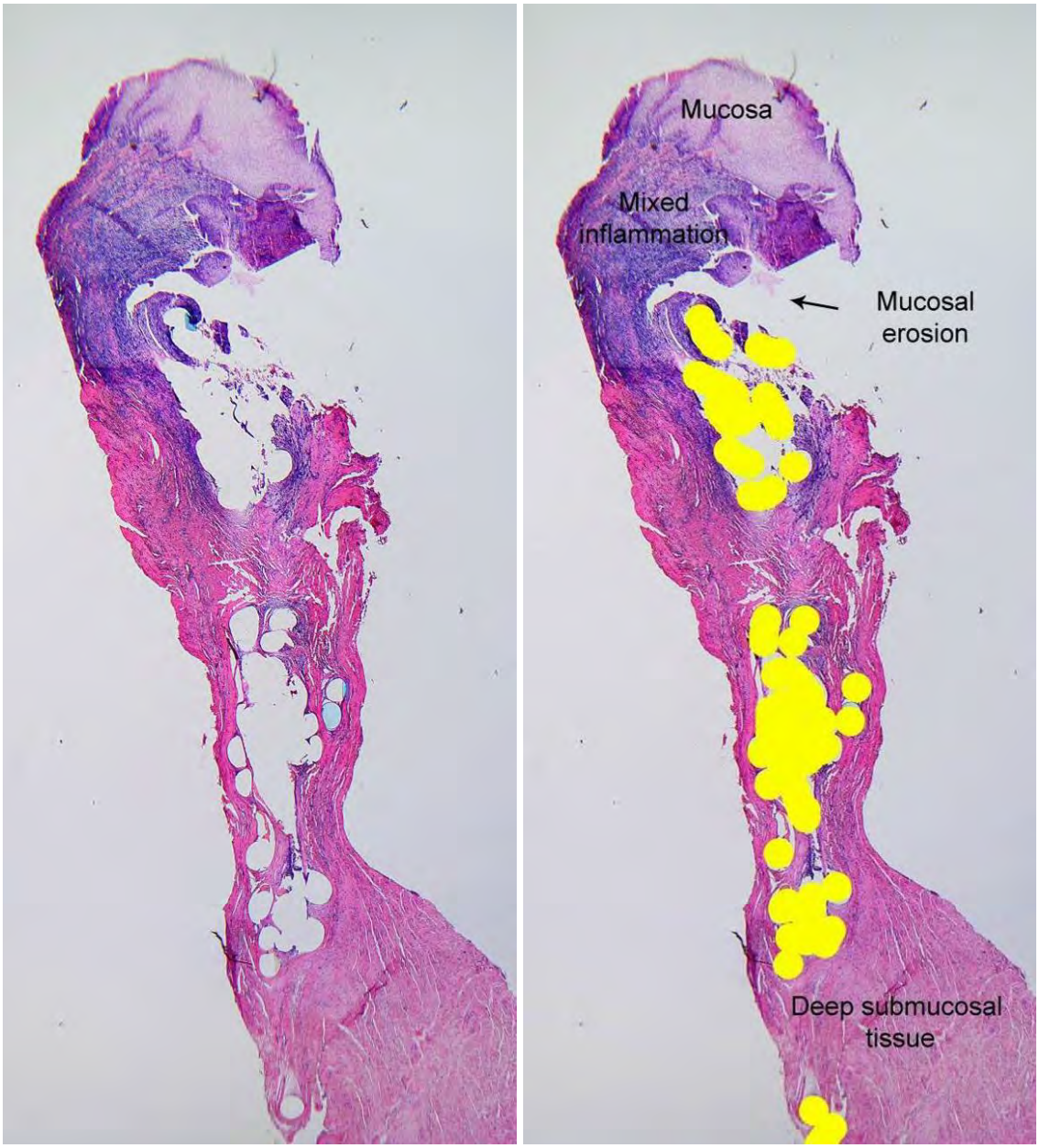



Figure set 11c.An exposed edge of TVT sling rotated towards the mucosa, H&E, 2.5x.

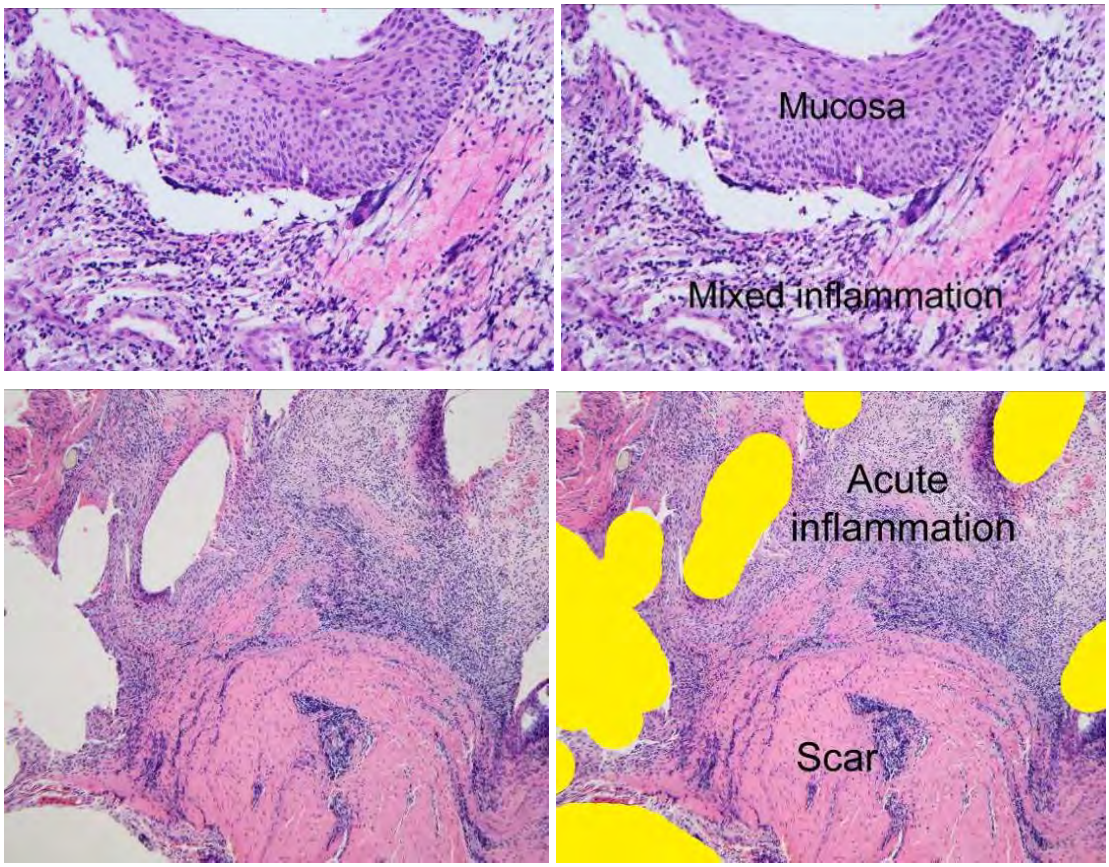



Figure set 12a.Acute inflammation at a site of TVT exposure, H&E, 2.5x.

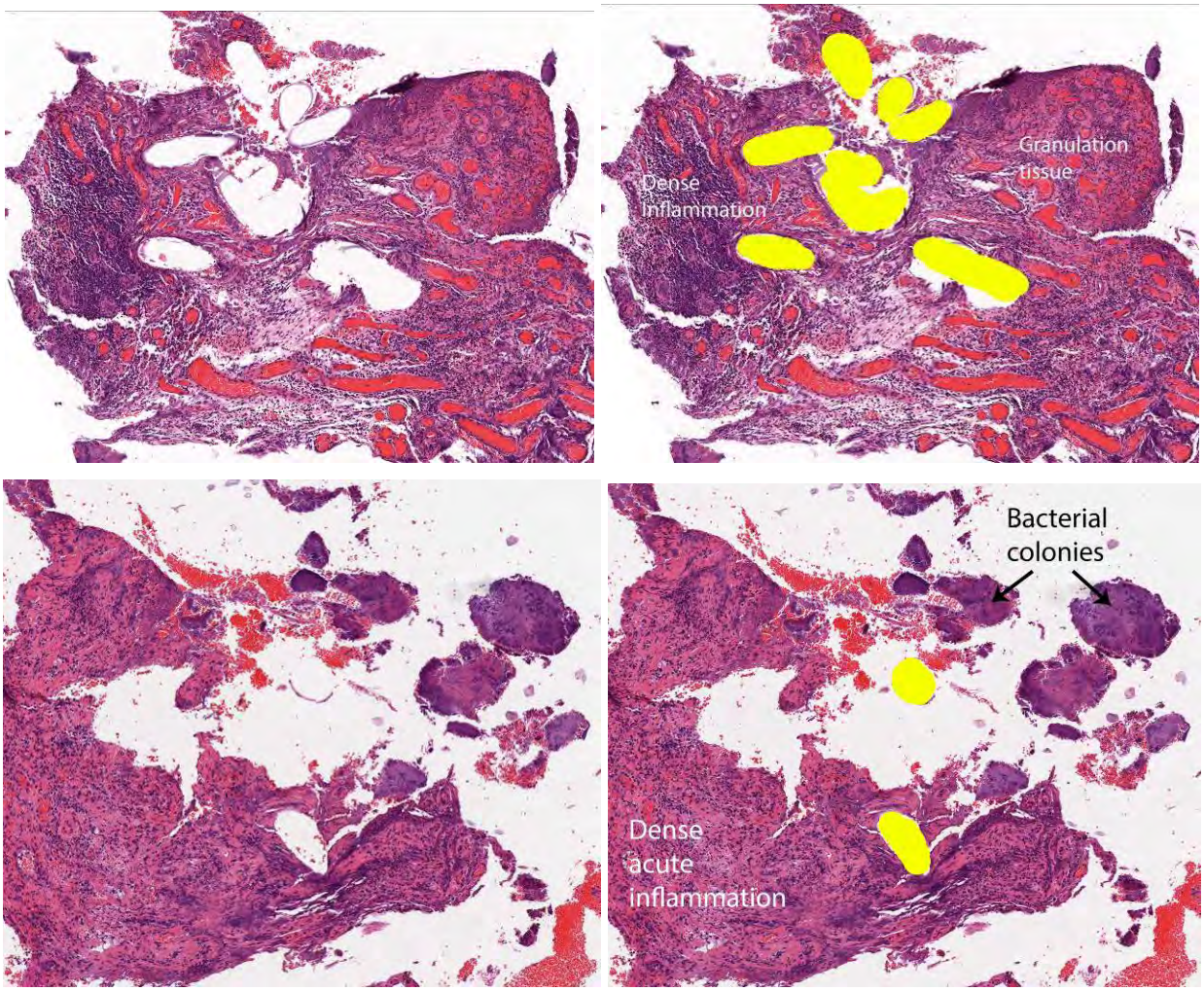



Figure set 12b.Granulation tissue, cute inflammation and bacterial colonies at a site of Gynecare mesh exposure, H&E, 2.5x.

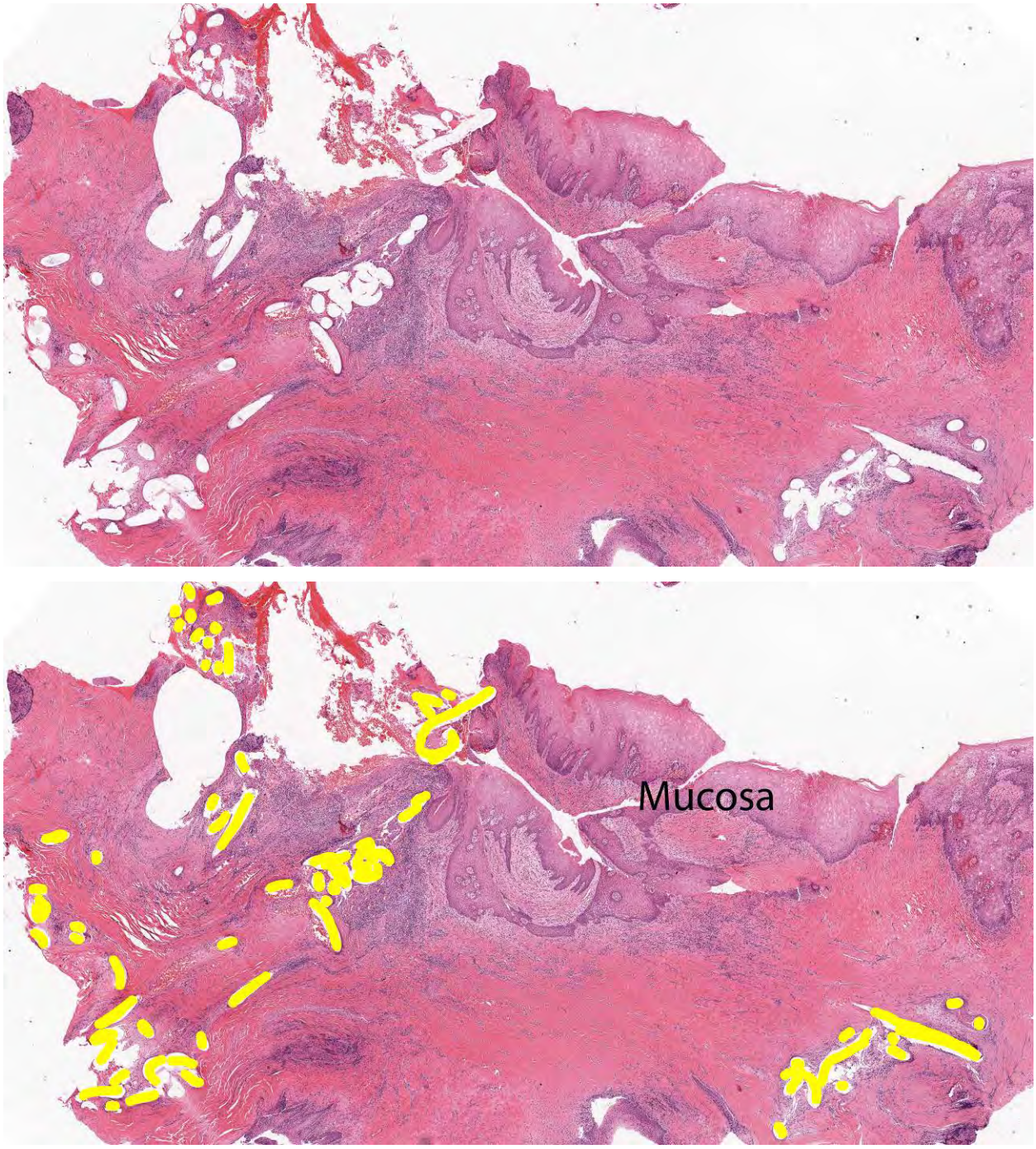



Figure set 12c. Mesh erosion through vaginal mucosa, H&E, 1.6x.

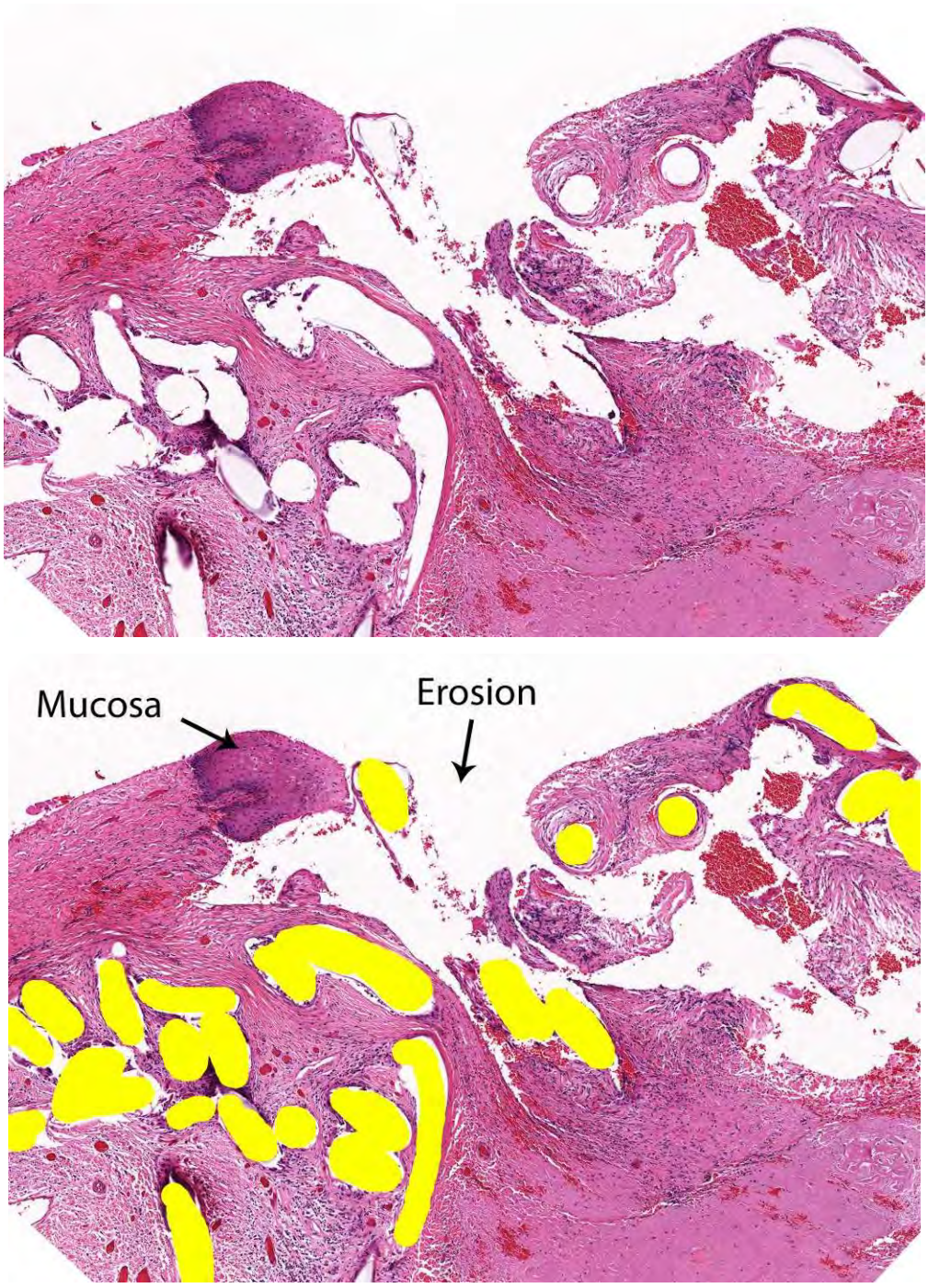



Figure set 12d. Mesh erosion through vaginal mucosa, H&E, 4x.

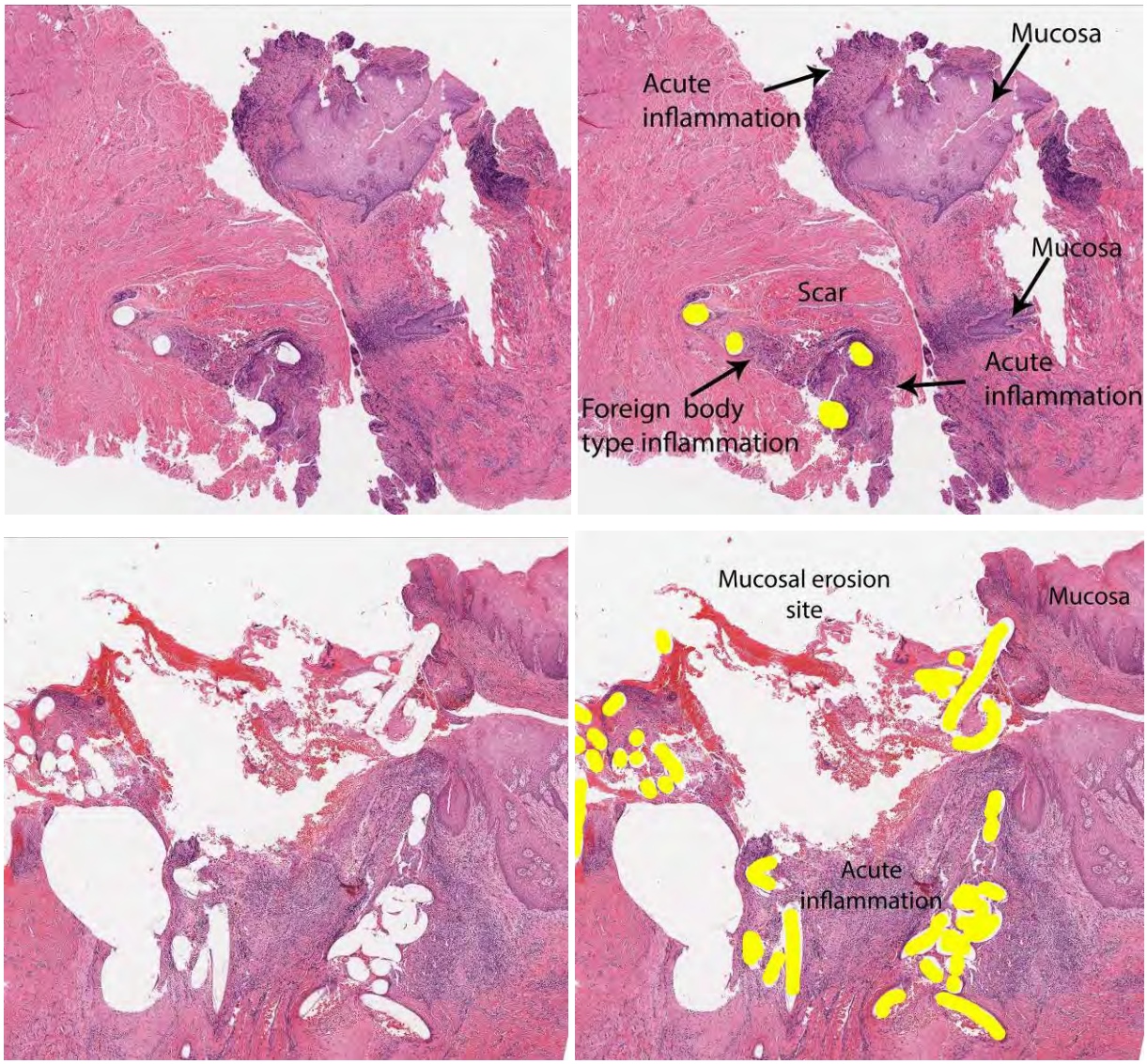



Figure set 12e. .Mesh erosion through vaginal mucosa, H&E, 1.6x.

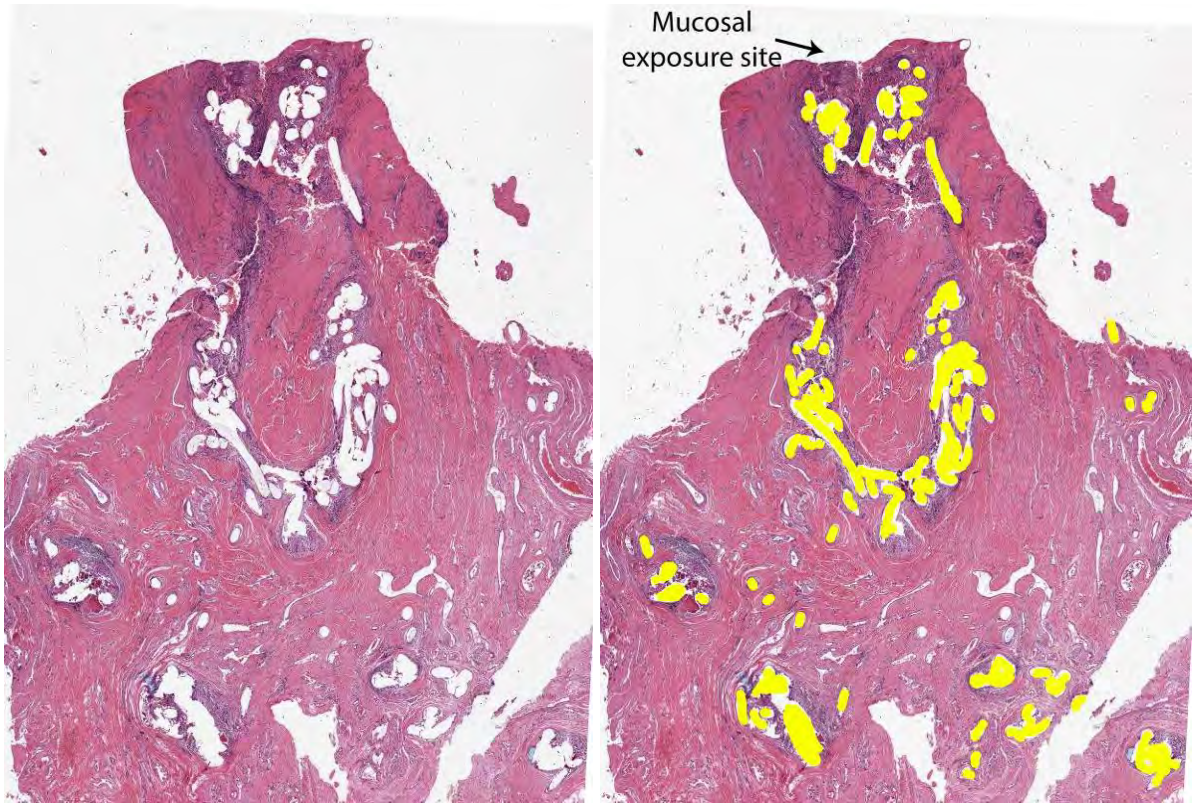



Figure set 12f. Mesh erosion through vaginal mucosa, H&E, 1.6x.

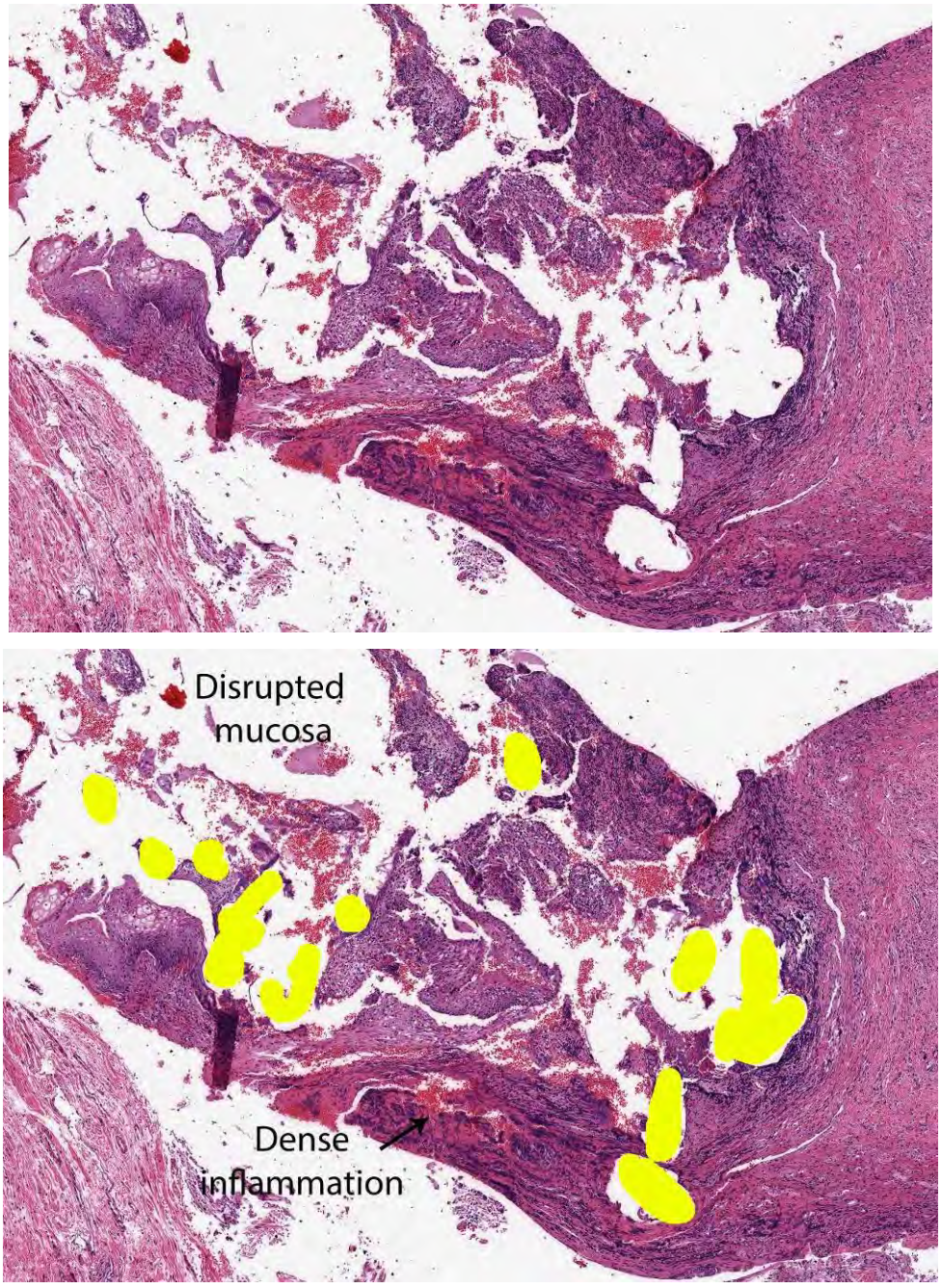



Figure set 12g. .Mesh erosion through vaginal mucosa, H&E, 1.6x.

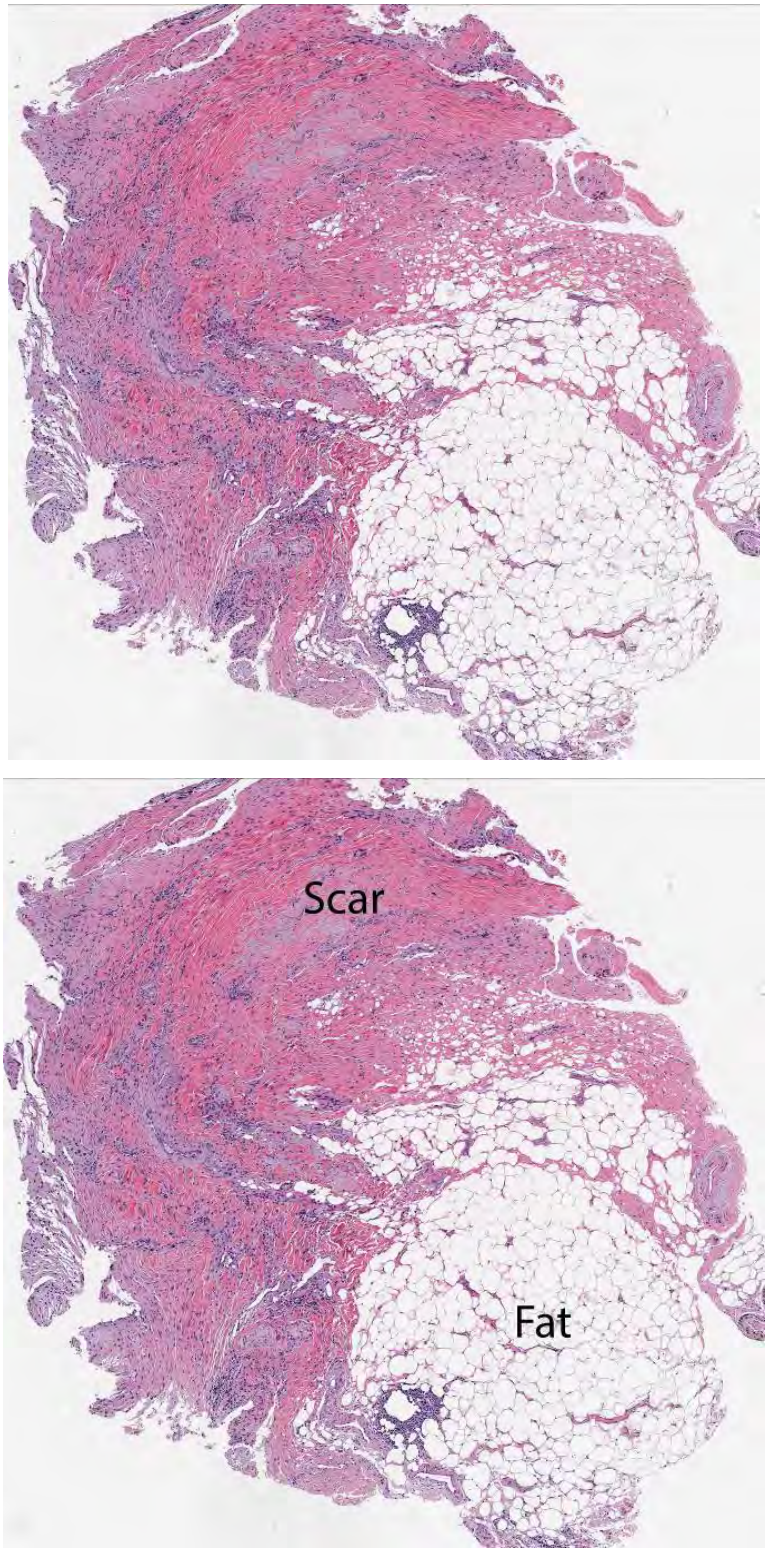



Figure set 12h. .Extension of inflammation and scarring from a mesh erosion site into the deep soft tissue, H&E, 1.6x.

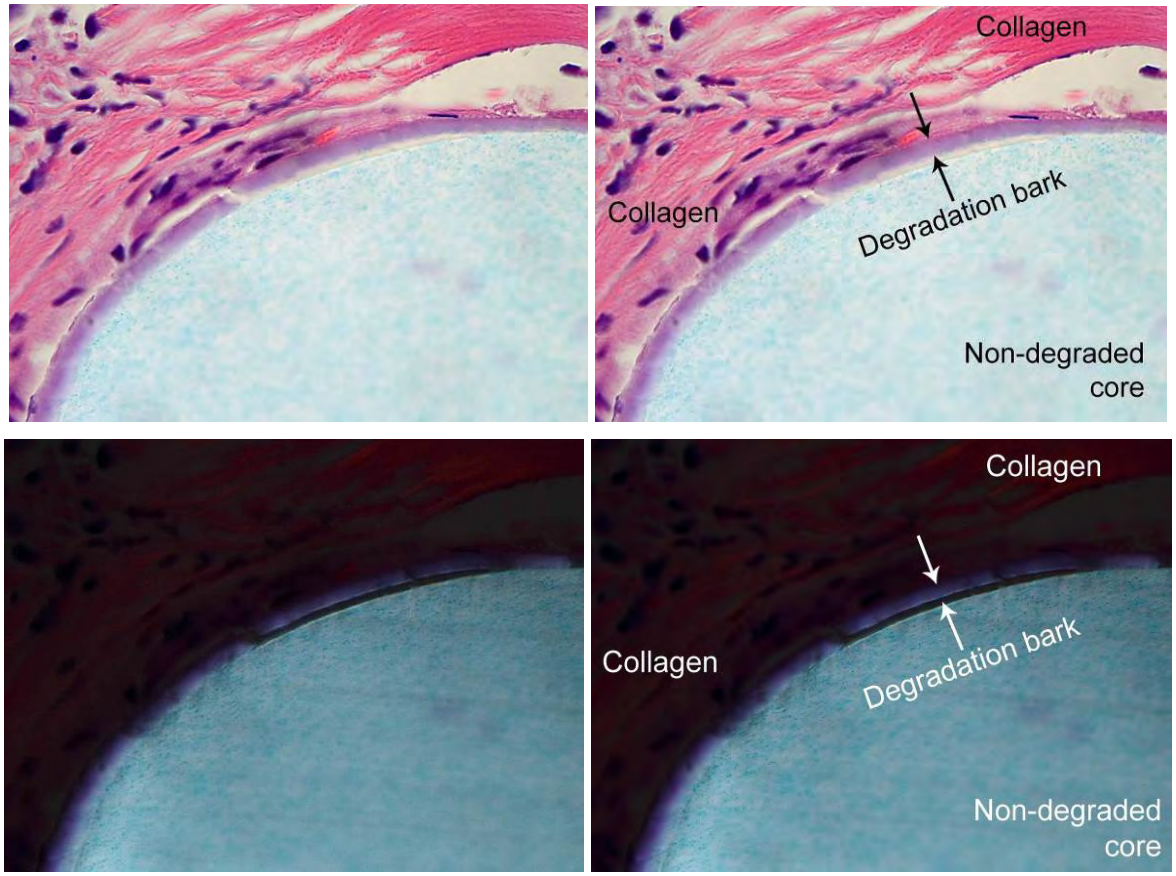



Figure set 13a.Polypropylene degradation layer in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x.

Note that collagen, one of the most refractile components of human tissue is much darker than polypropylene in polarized light.

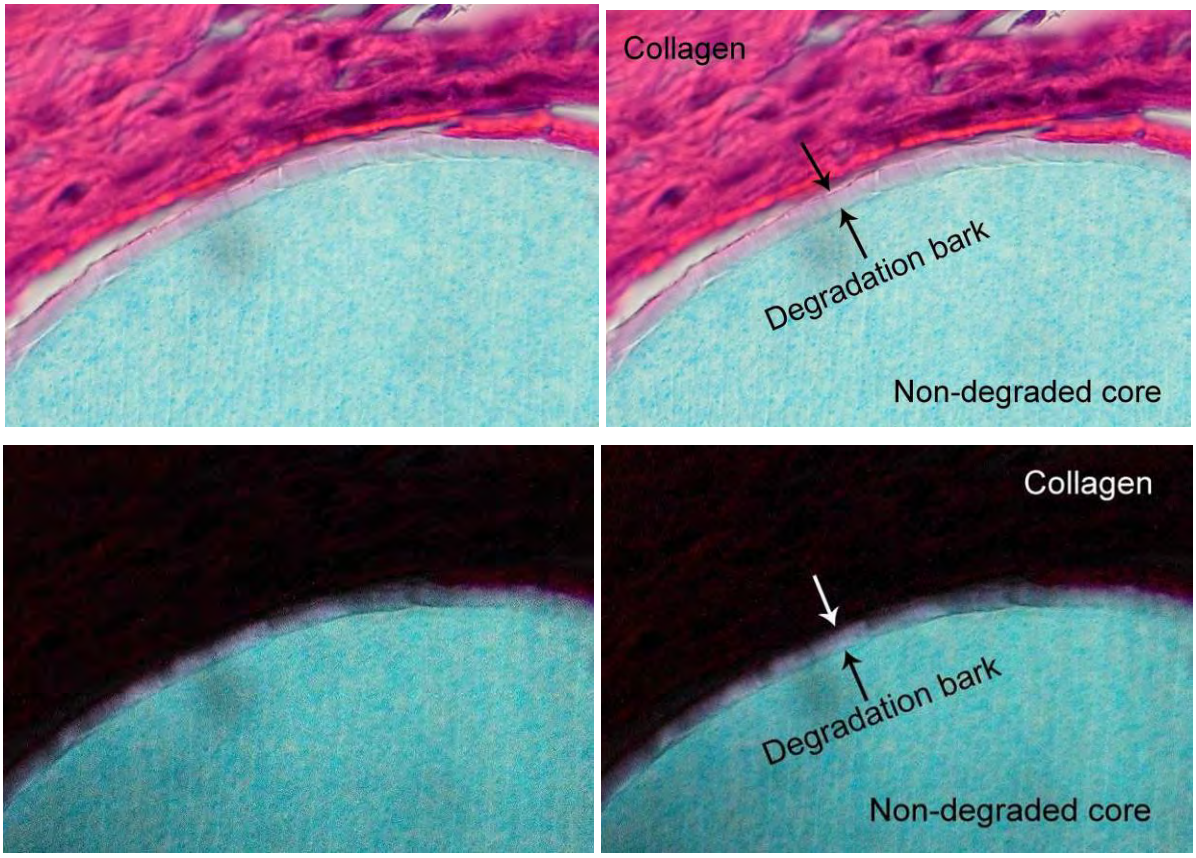



Figure set 13b.Polypropylene degradation layer in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x.

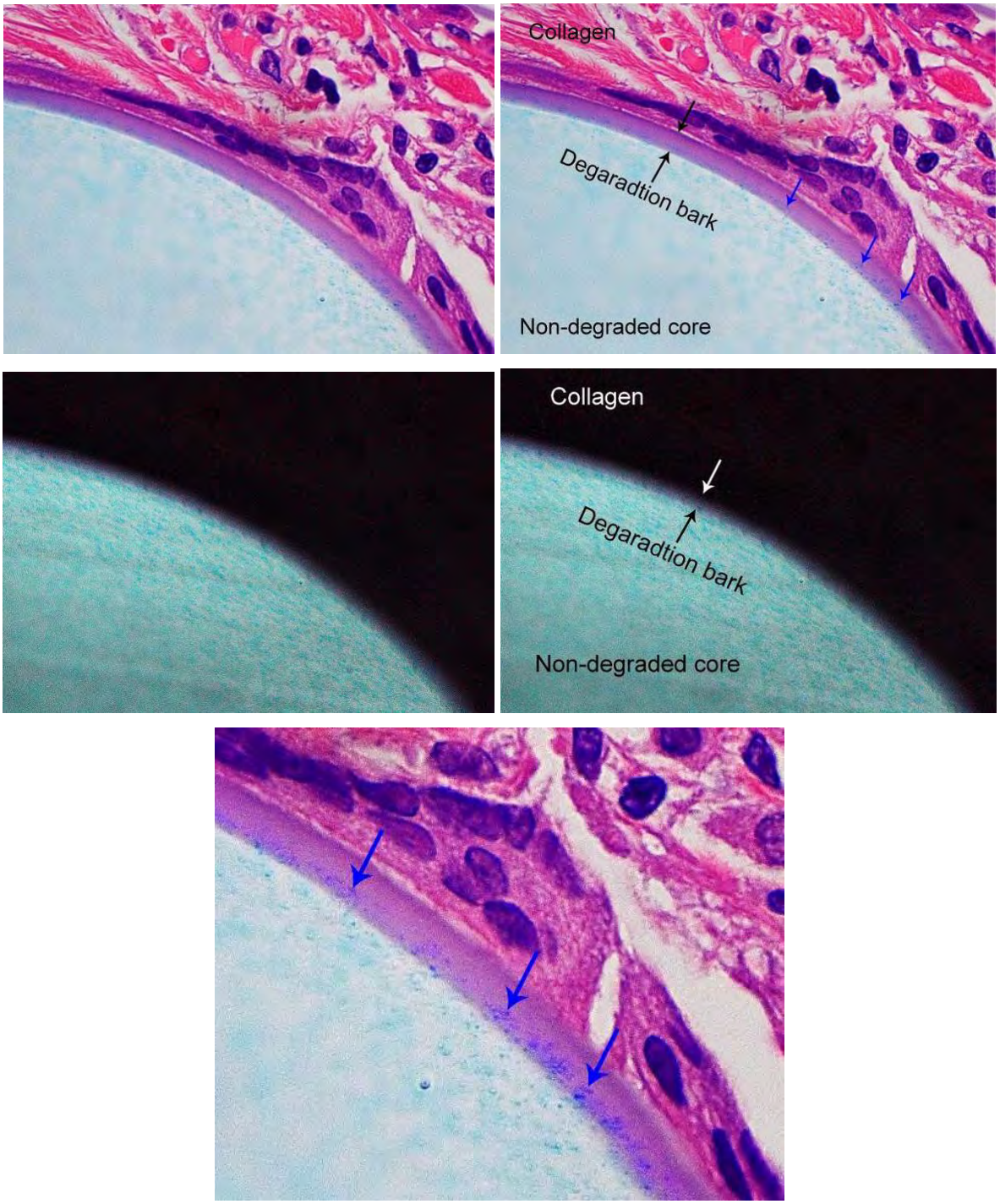



Figure set 13c.Polypropylene degradation layer in regular (upper panel) and the same field in polarized light (middle panel), H&E, 100x.

The mesh filament was manufactures with addition of blue dye granules. The granules are present in the degraded layer confirming its origin from polypropylene (lower panel).

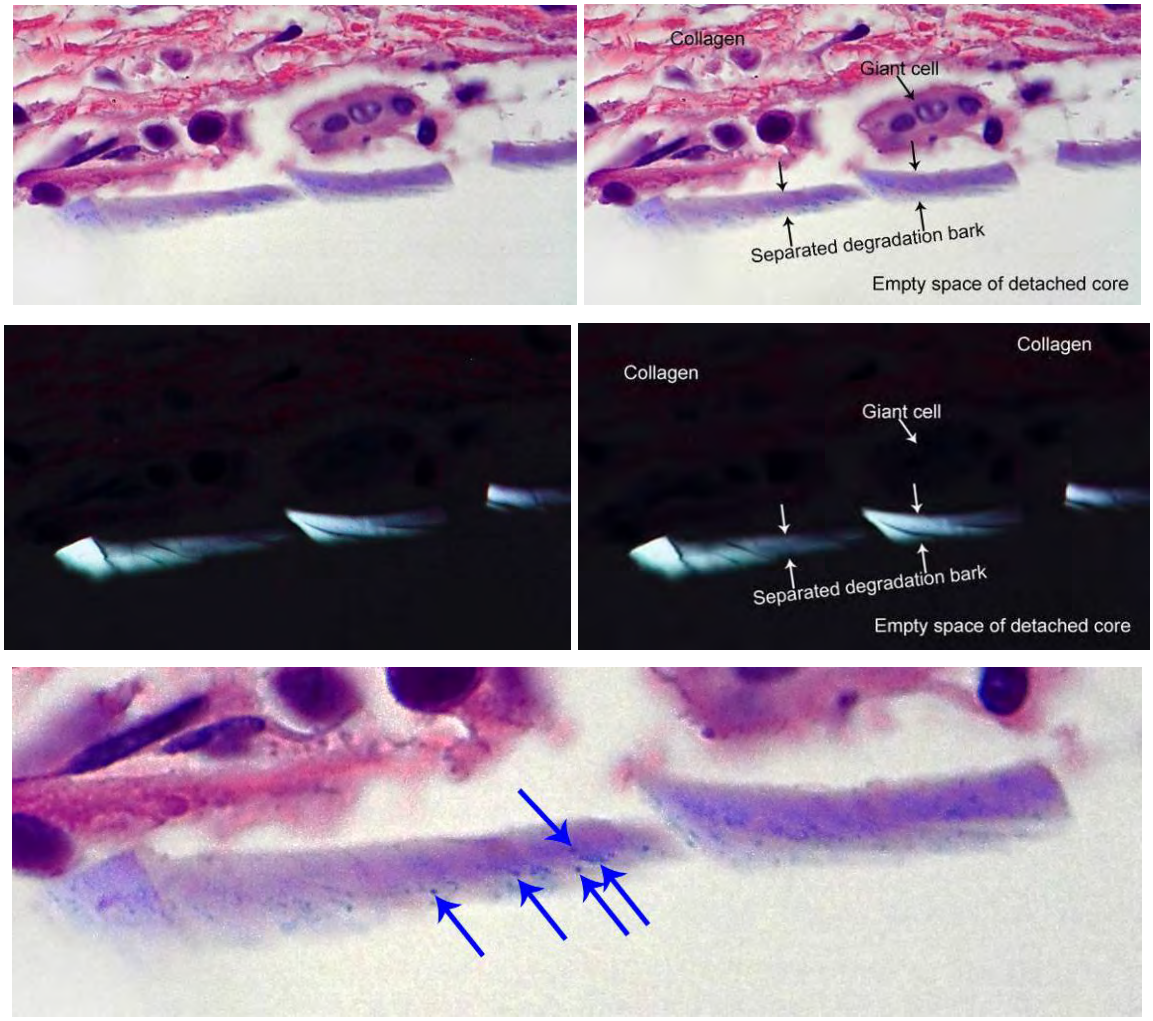



Figure set 13d.Polypropylene degradation layer in regular (upper panel) and the same field in polarized light (middle panel), enlargement is in the lower panel, H&E, 100x.

In this field the bark detached from the core and neither its birefringence nor presence of the blue granules can be explained by an overlap with the core.

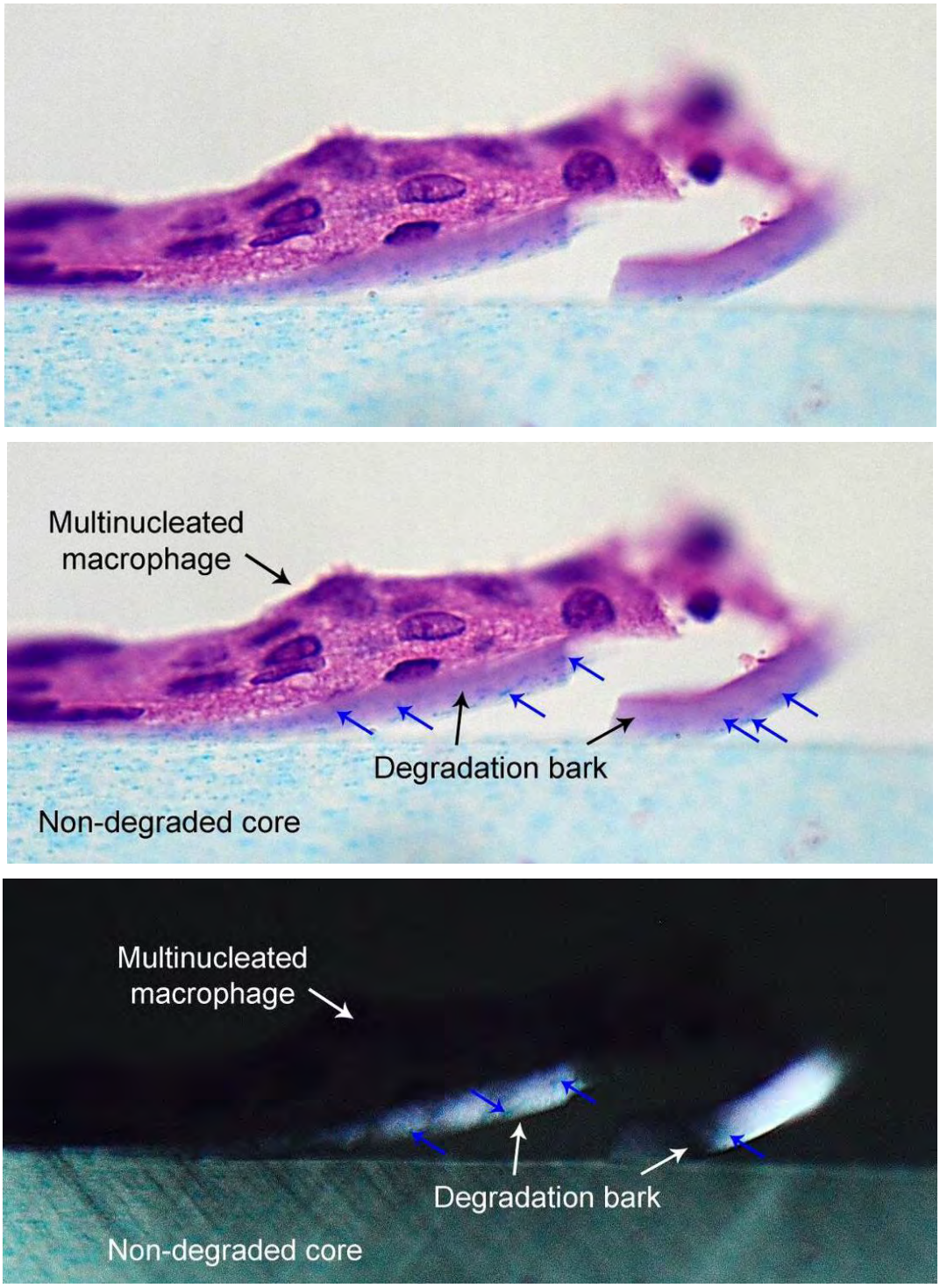



Figure set 13e.Polypropylene degradation layer in regular (upper panels) and the same field in polarized light (lower panel), H&E, 100x.

In this field the bark detached from the core and neither its birefringence nor presence of the blue granules can be explained by an overlap with the core.

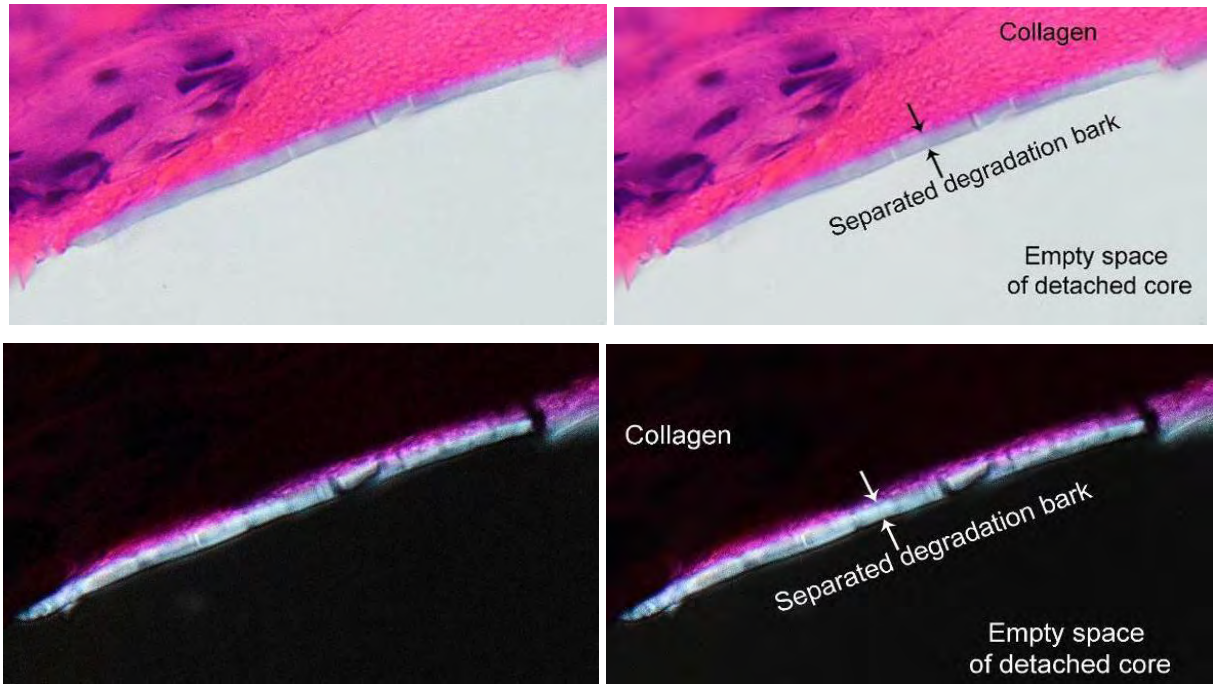



Figure set 13f.Polypropylene degradation layer in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x.

In this field the bark detached from the core and its birefringence cannot be explained by light scatter from the core.

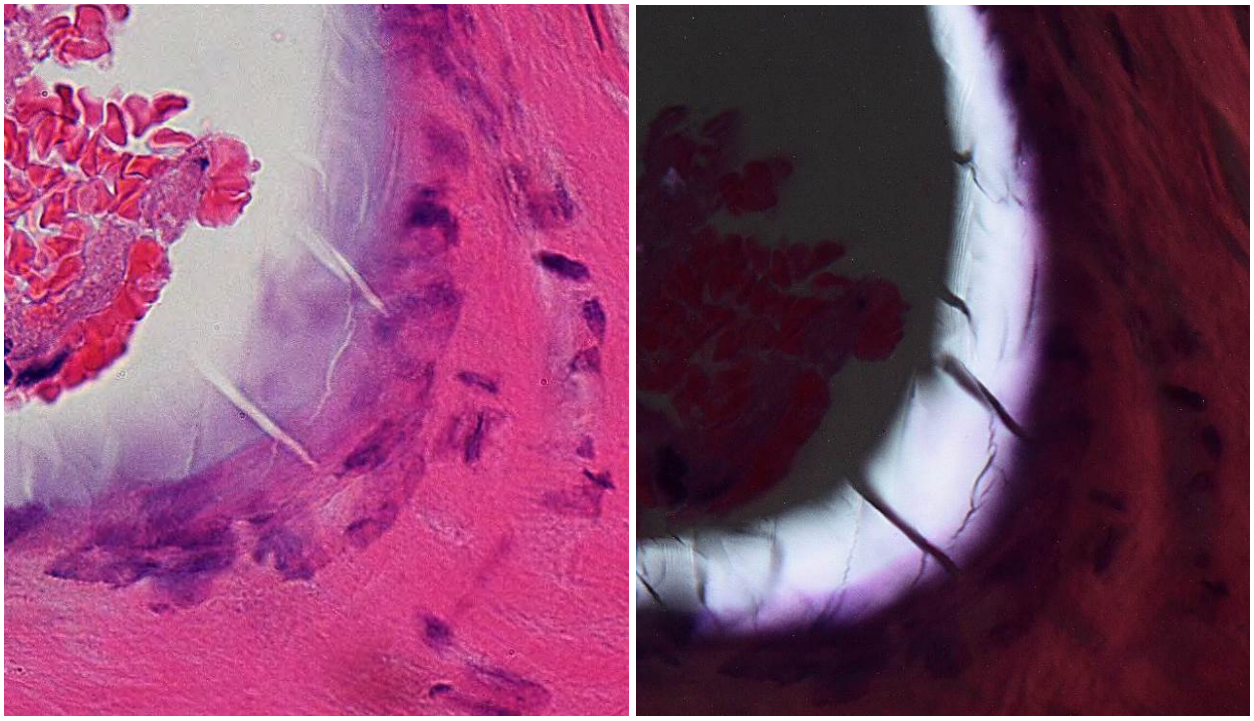


Figure set 13g.Cracked polypropylene degradation layer in regular (left) and the same field in polarized light (right), H&E

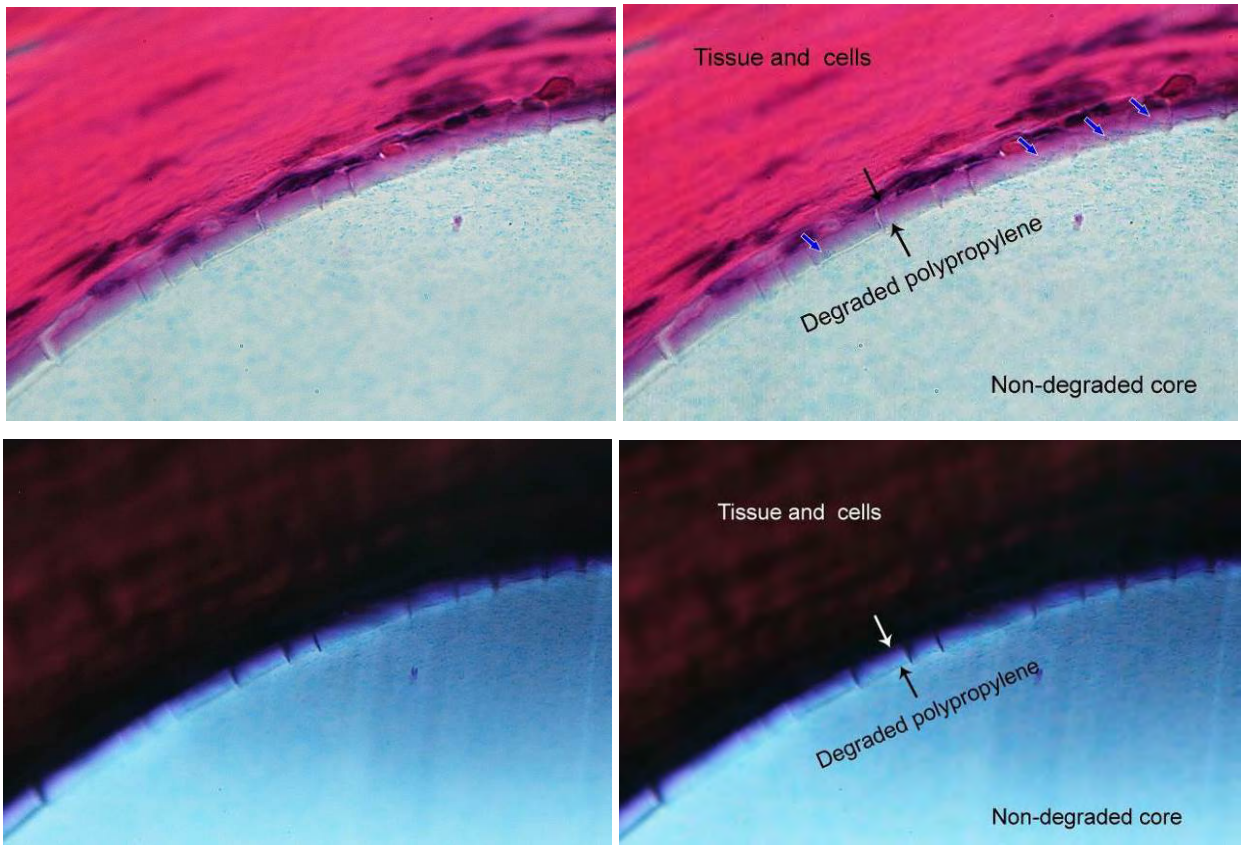



Figure set 13h.Cracked polypropylene degradation layer in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x

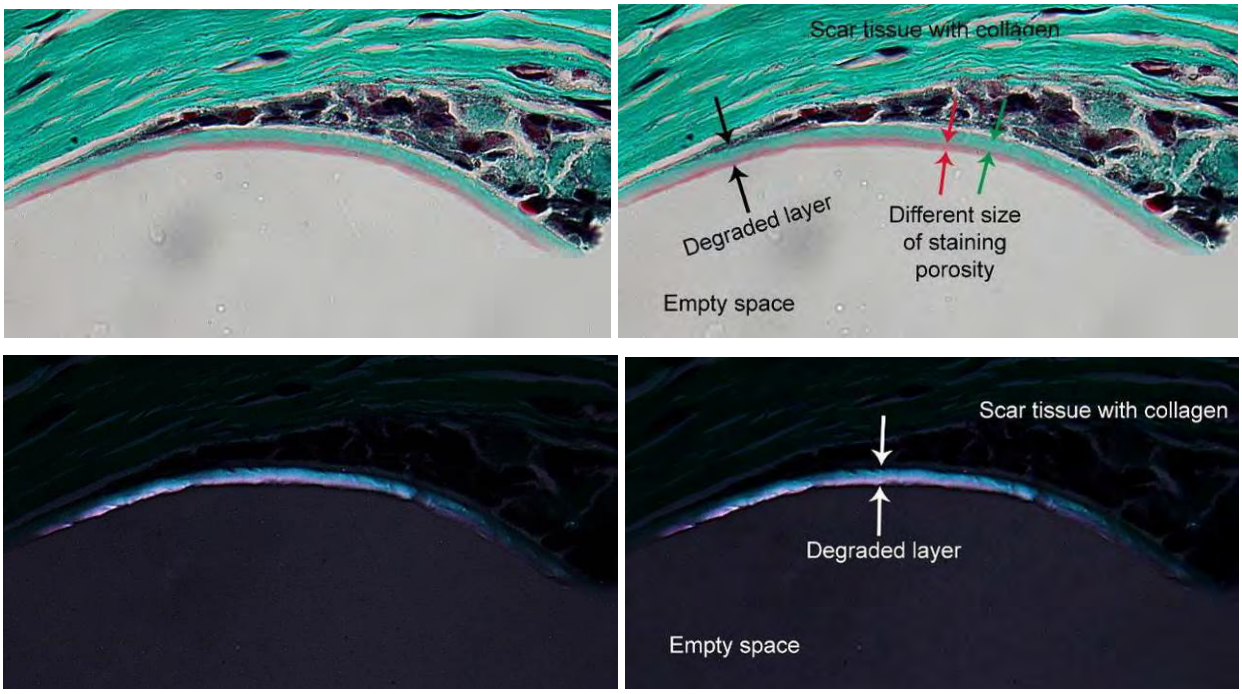



Figure set 13i.Higer degree of degradation and expansion of degradation nanocavities towards the surface of the degradation layer, in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x.

Red dye has smaller molecular size and higher penetration ability. The green dye becomes trapped in the larger nanopores.

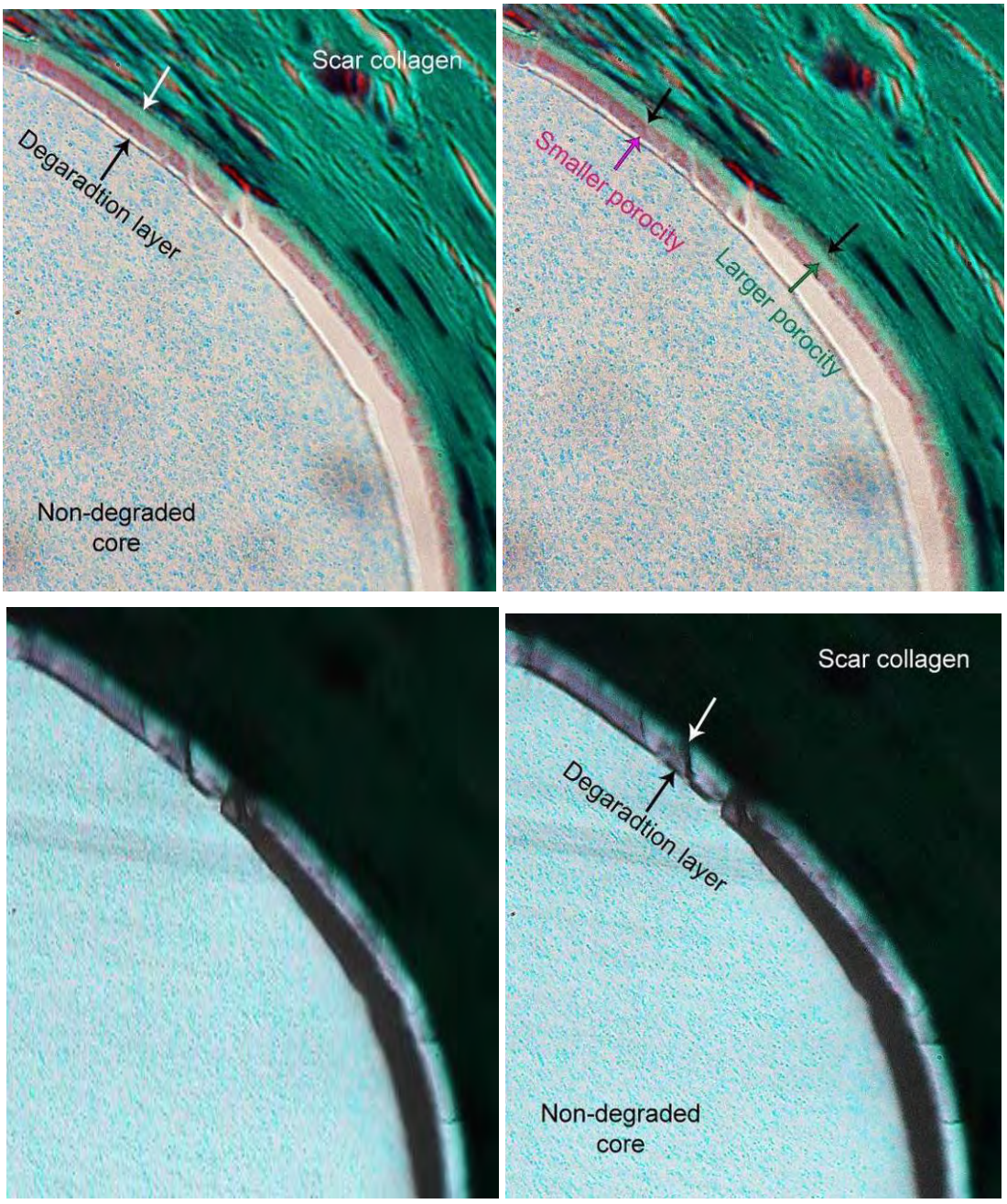



Figure set 13j.Higer degree of degradation and expansion of degradation nanocavities towards the surface of the degradation layer, in regular (upper panel) and the same field in polarized light (lower panel), H&E, 100x.

Red dye has smaller molecular size and higher penetration ability. The green dye becomes trapped in the larger nanopores.

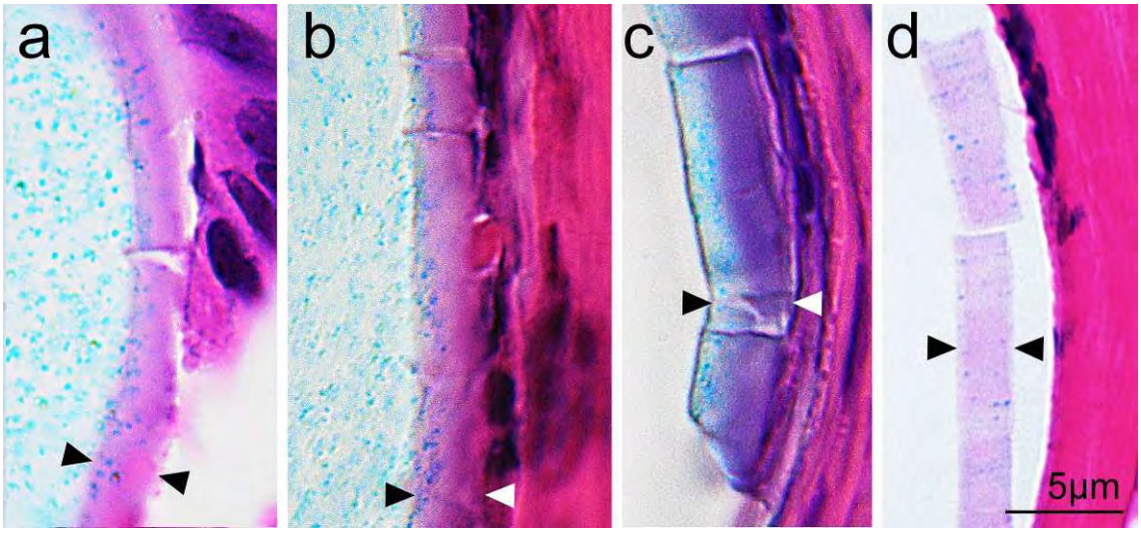



Figure set 13k. Granules of blue dye retained in the degraded layer, images include TVT slings.

[556]

*"Degradation "bark" of the blue fibers manufactured with inclusion of blue dye granules, H&E stain, 100x objective with oil immersion: (a) and (b) non-degraded core (left half of the images) and the degraded layer (between arrowheads). Note that the blue granules are retained in the layer of degraded polypropylene. Within the degraded "bark", the granules degrade and loose color toward the surface. In (c) and (d) the non-degraded core detached from the slides similarly to Figure 2(c and d). At these sites, presence of the granules in the separated "bark" cannot be attributed to an overlap with the core."*

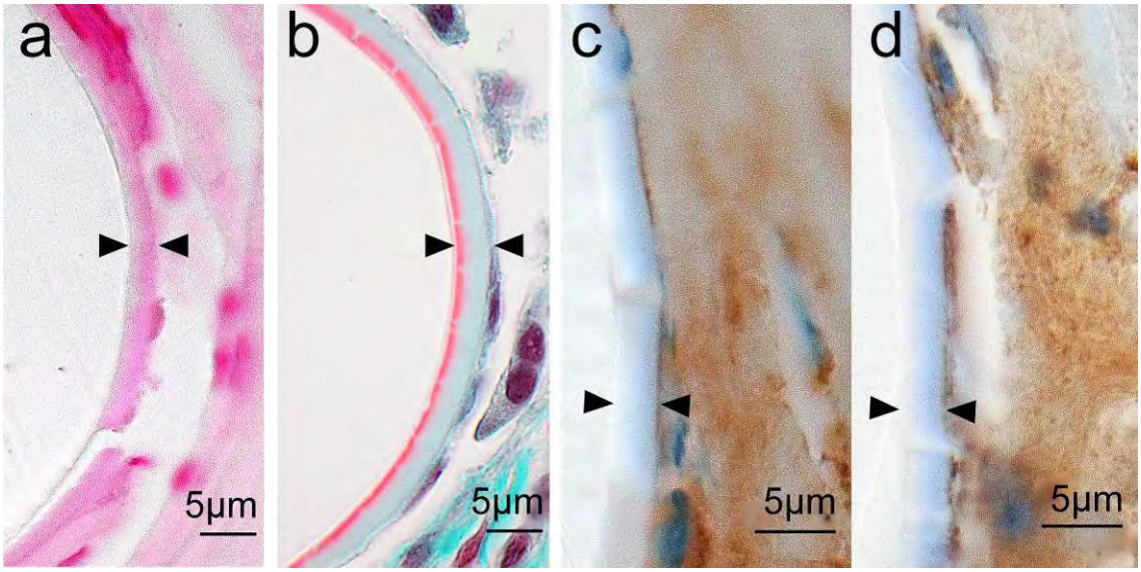



Figure set 13l. Additional stains, images include TVT sling. [556]

**"***Additional stains, all images taken with 100x oil immersion objective and cropped to a different magnification, polypropylene degradation layer is pointed between arrowheads: (a) Von Kossa stain is negative for calcium in the brittle "bark" (would stain calcium black), (b) trichrome stain shows that the deeper parts of the "bark" have smaller staining porosity (red) than those close to the surface (green) which correlates with TEM findings [Figure 6(b)], (c) immunohistochemical stain for immunoglobulin G (IgG, stained brown). IgG is present in almost all human tissues and fluids. It is deposited on the surface of degraded polypropylene but is not mixed within it. (d) Immunostain for the oxidizing enzyme of inflammatory cells myeloperoxidase (stains brown)."*

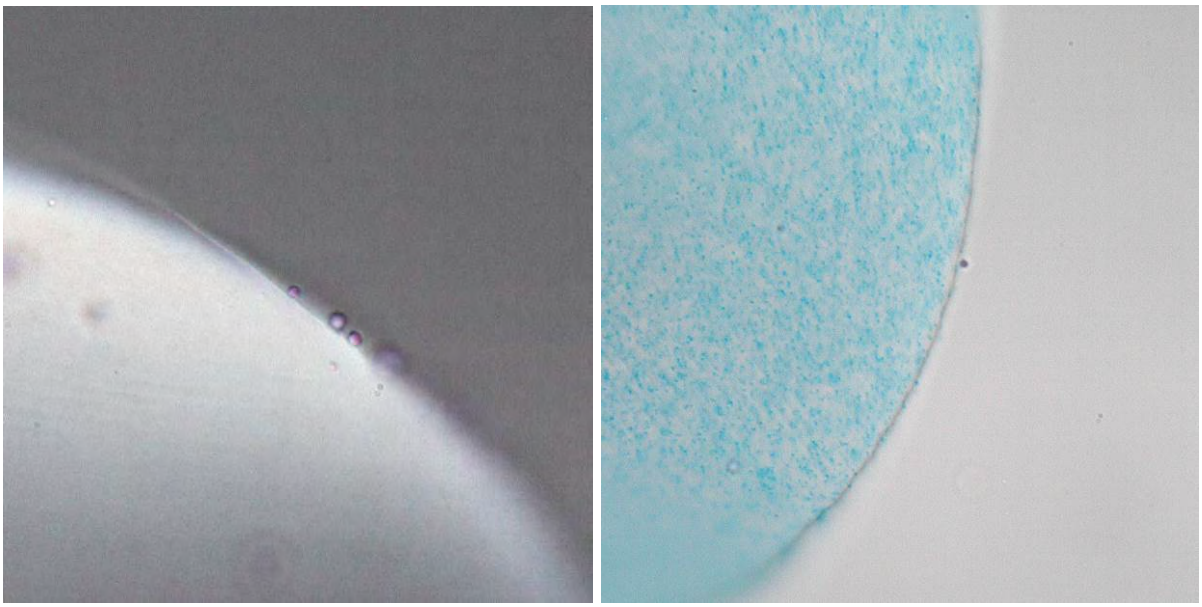


Figure set 14. Absence of degradation in pristine TVT meshes after exposure to formalin (up to 4 months), H&E, 100x.

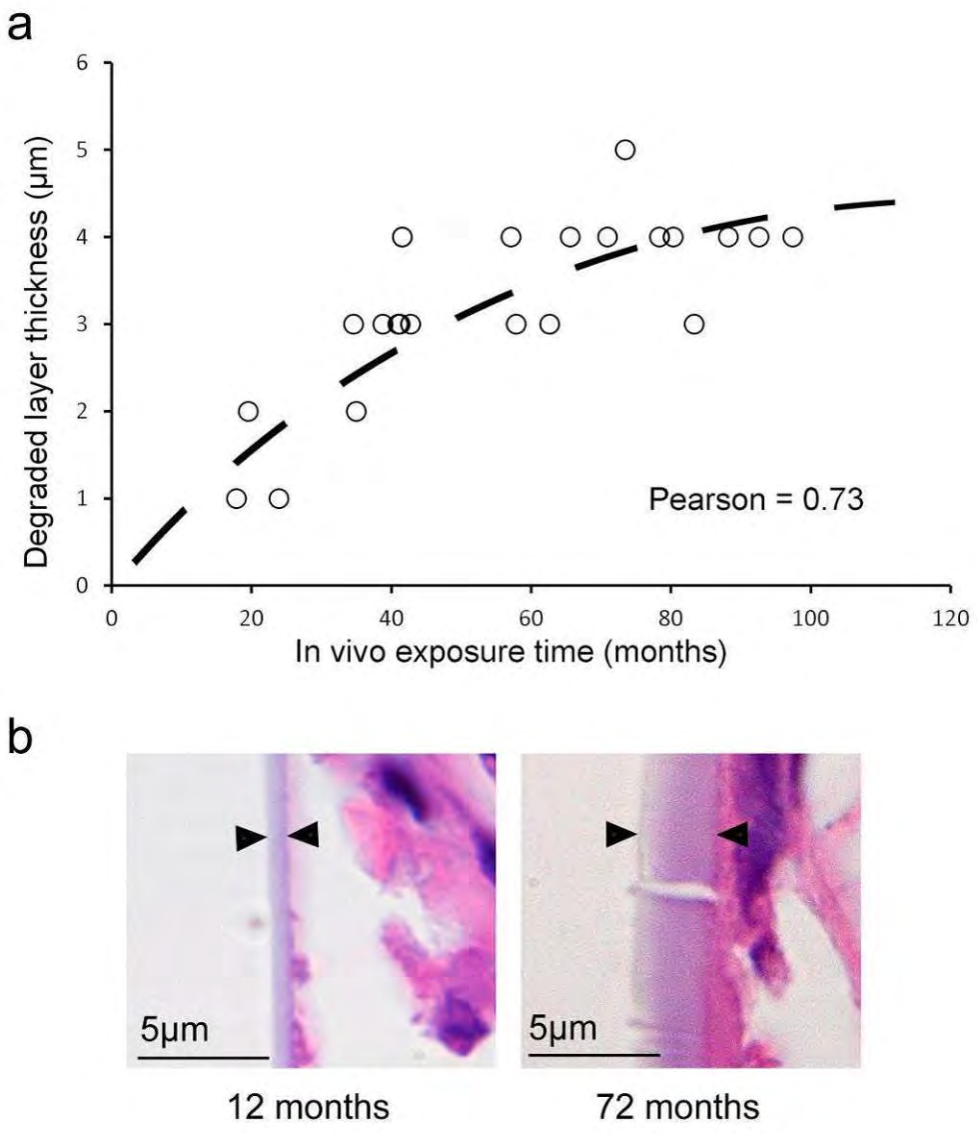



Figure set 15. TVT meshes analyzed as a group. [556]:

*"Duration of in vivo exposure versus thickness of degraded layer in a group of explants of the same manufacturer and the same mesh design. (a) Thickness of the degradation "bark" increased over the years in vivo (Pearson correlation50.73). Note the trend of plateauing after 5–6 years. There was no correlation of the thickness with the duration of specimen storage in formalin (not shown, Pearson520.06). (b) Comparison of the "bark" in meshes explanted after 12 and 72 months in the body, H&E, 3100 objective with oil immersion, images cropped to the same magnification factor."*

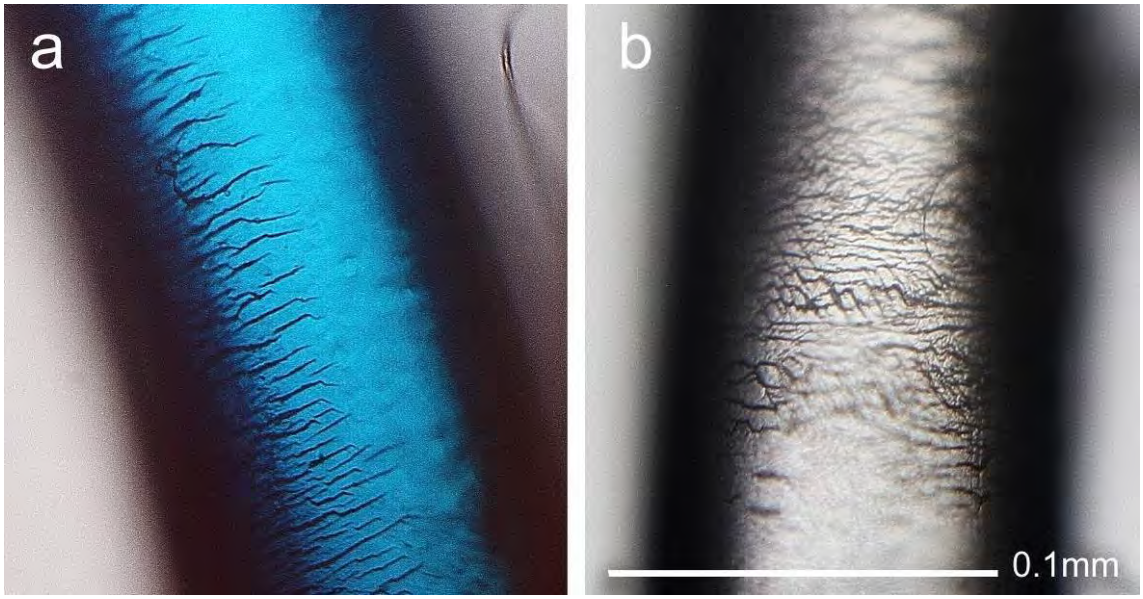



Figure set 16a. Cracking on the surface of TVT mesh fibers immediately after removal from the body. [556]:

**"***Surface of the mesh fibers immediately after explantation from the body, transvaginal sling explanted due to pain 9 years after implantation, light microscope, 20x objective with image crop. Mesh fibers at the specimen edges had no covering tissue and could be examined as they were in the body, avoiding possible artifacts of tissue removal, drying or contact with formalin. Both blue (a) and clear (b) fibers showed surface cracking."*

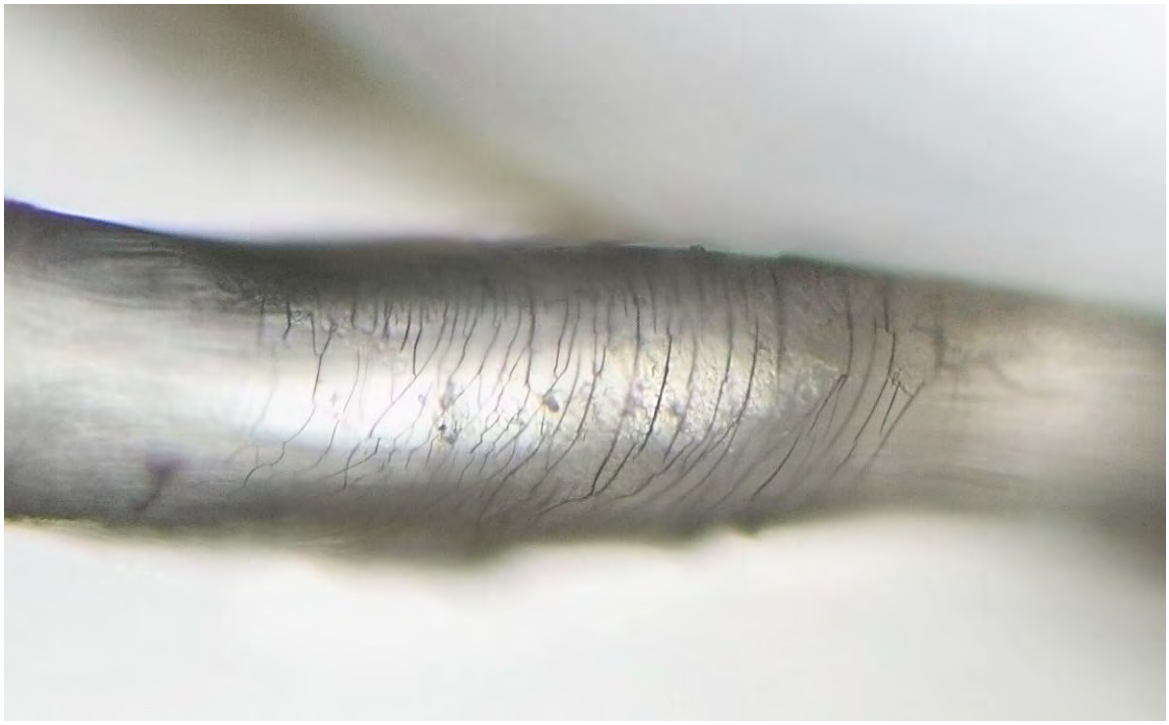


Figure set 16b. Cracking on the surface of TVT mesh fibers.

The microphotograph is composed of images focused at different planes. The mesh fiber was examined in regular light microscope before the specimen was divided (photo below). The examined and photographed mesh fiber was in the portion which was taken by the defense expert (arrow).

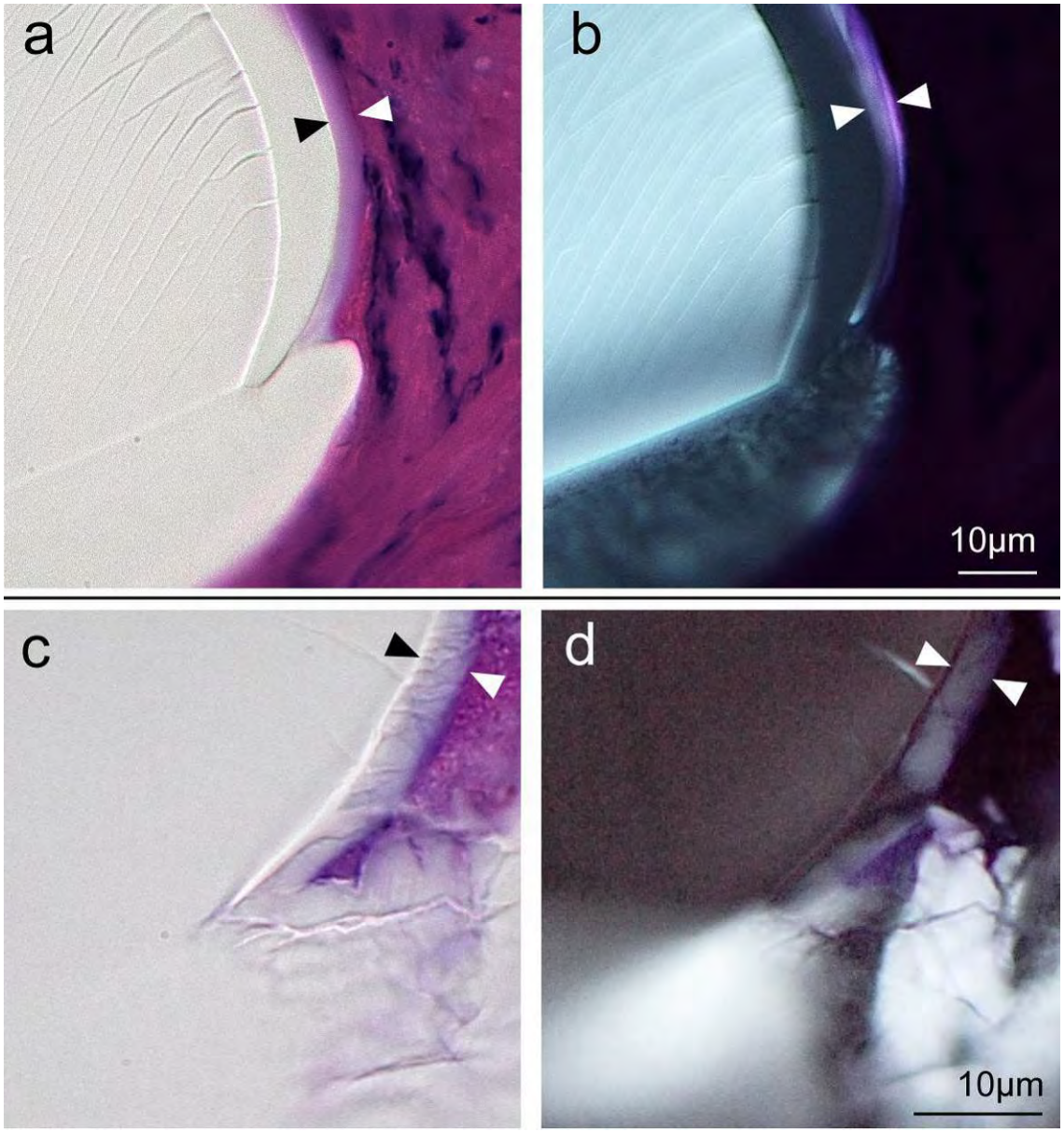



Figure set 17. Melting of the degradation layer under the heat of surgical cautery. [556]

***"Melting of both non-degraded and degraded polypropylene caused by the surgical cautery, H&E, 100x oil immersion: (a) and (b) the same site of fiber melting in regular and polarized light, (c) and (d) another site showing melding point. While molten the non-degraded core and the degradation "bark" formed a common pool of material."***

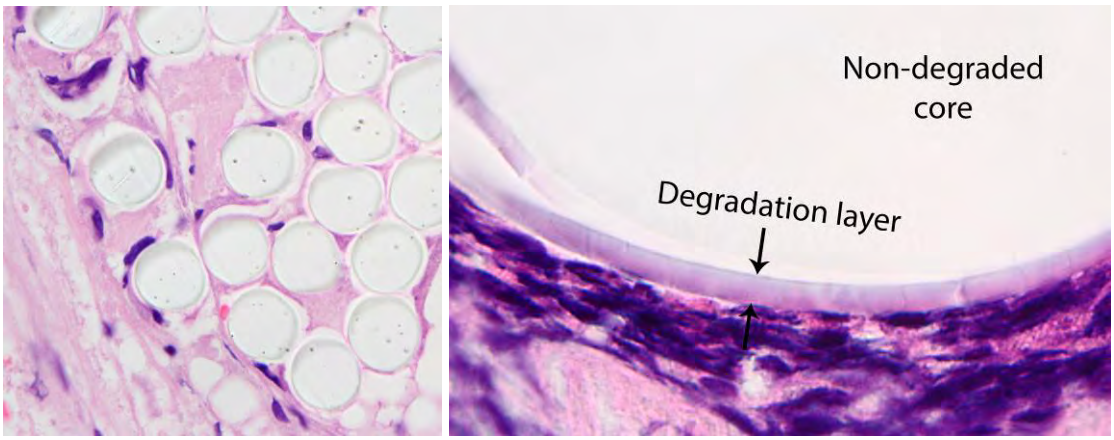



Figure set 18a. Comparison of a non-polypropylene suture on the left and Prolene mesh on the right implanted at the same time, H&E, 100x objective.

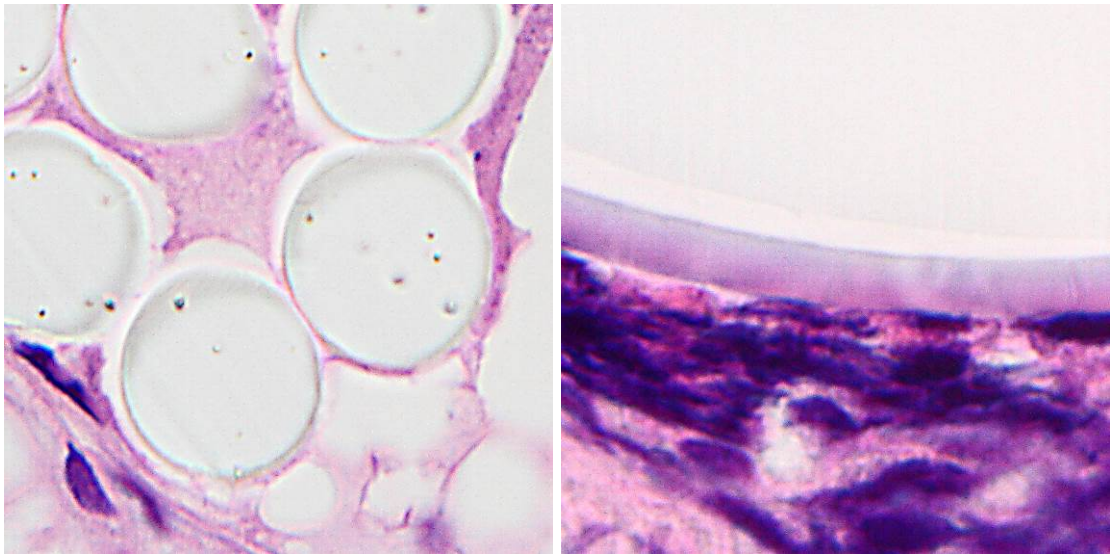


Figure set 18b. Cropped to the same magnification factor, non-polypropylene multifilament suture on the left and Gynemesh (polypropylene) on the right, H&E, 100x objective.
Both materials have been implanted at the same time. The multifilament suture fibers do not have any outer layer. Polypropylene formed a layer of altered material.

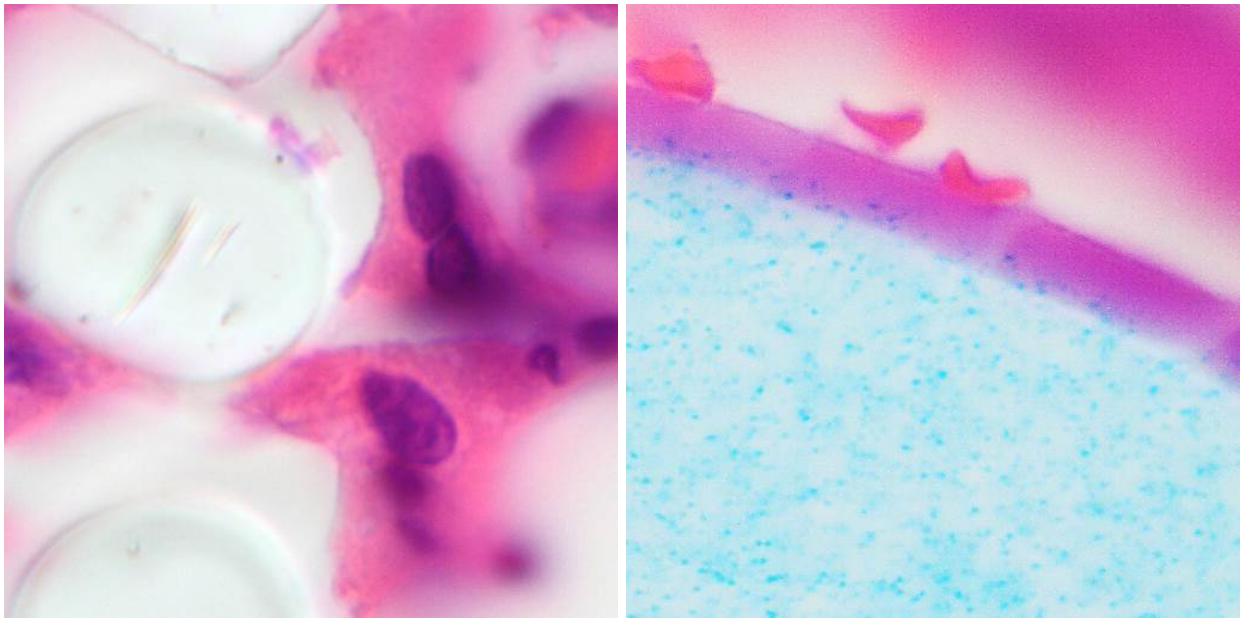


Figure set 18c. Another case of a multifilament suture present in the specimen, cropped to the same magnification factor, non-polypropylene multifilament suture on the left and a TVT fiber (polypropylene) on the right, H&E, 100x objective.

Both materials have been implanted at the same time. The multifilament suture fibers do not have any outer layer. Polypropylene formed a layer of altered material.

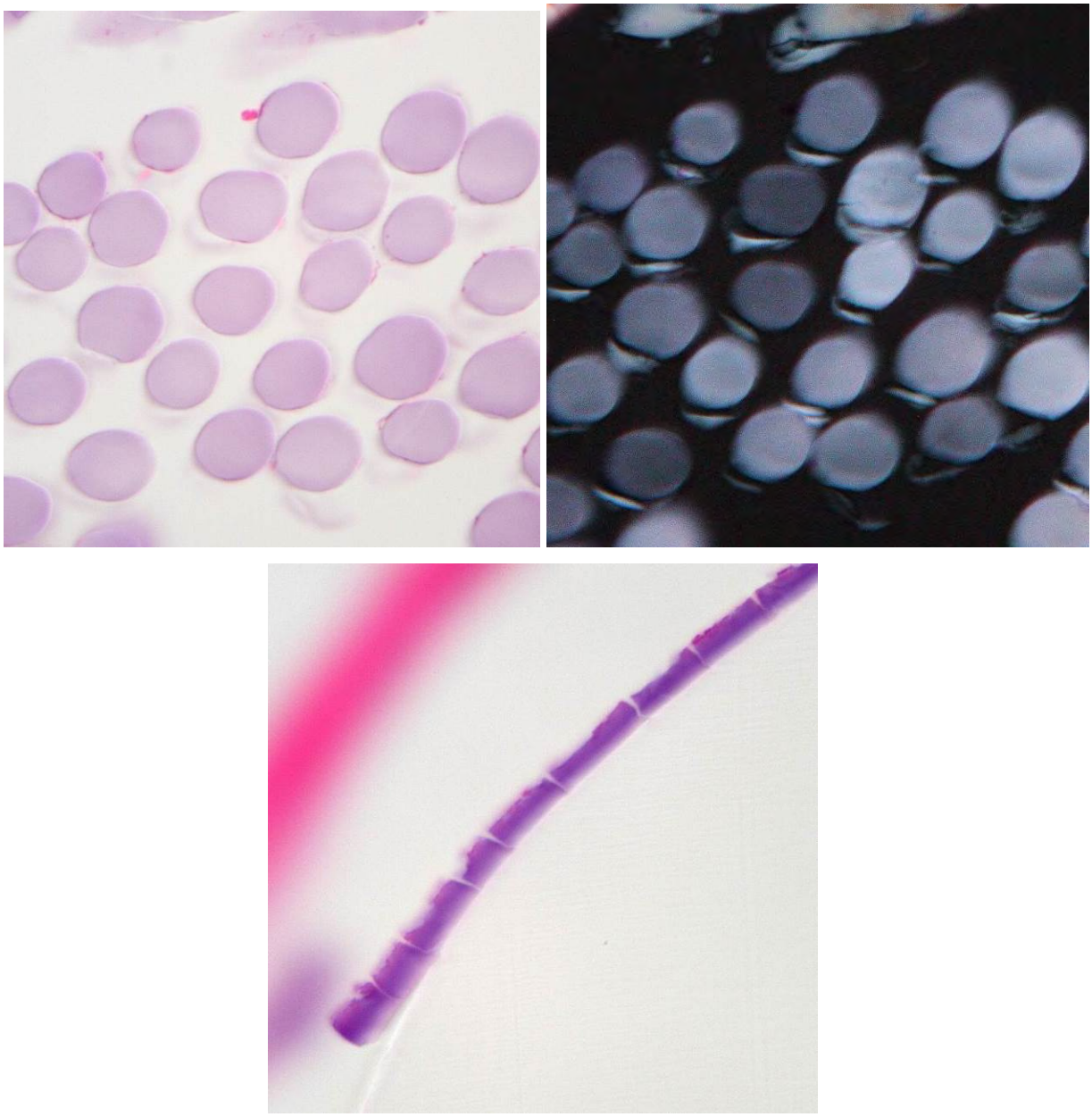


Figure set 18d. Cropped to the same magnification factor, non-polypropylene multifilament suture at the top and a TVT (polypropylene) in the lower image, H&E, 100x objective.
In this case the suture was used intraoperatively and had no in vivo exposure to the body. Note that the matrial absorbed the dye. Although non-degraded, a porous polymer can absorb dyes. The finding shows a non-specific non-chemical (not covalent) nature of staining.

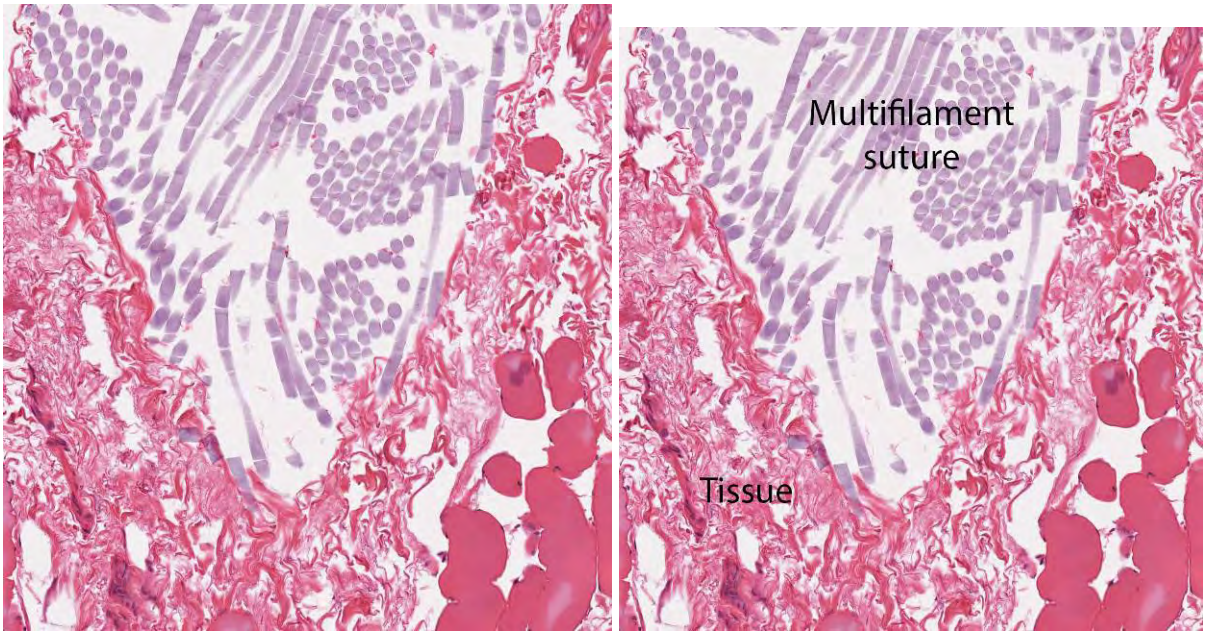
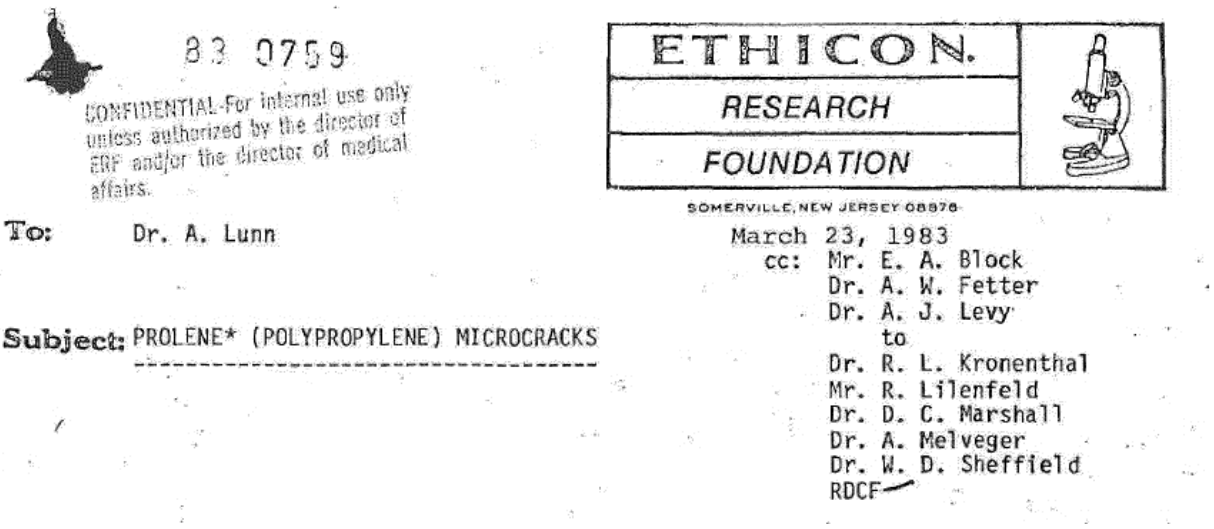



Figure set 18e. Image shows that there is no vital reaction to the multifilament suture, H&E, 20x objective.

The suture had no exposure to the body, it was used during the exscision surgery.

**Images and text from the Ethicon study using identical methodology to detect degradation of polypropylene.**



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ETHICON.
RESEARCH
FOUNDATION

SOMERVILLE, NEW JERSEY 08876

To: Dr. A. Lunn

March 23, 1983

cc: Mr. E. A. Block
Dr. A. W. Fetter
Dr. A. J. Levy
to
Dr. R. L. Kronenthal
Mr. R. Lilenfeld
Dr. D. C. Marshall
Dr. A. Melveger
Dr. W. D. Sheffield
RDCF

Subject: PROLENE* (POLYPROPYLENE) MICROCRACKS

Figure set 19a.

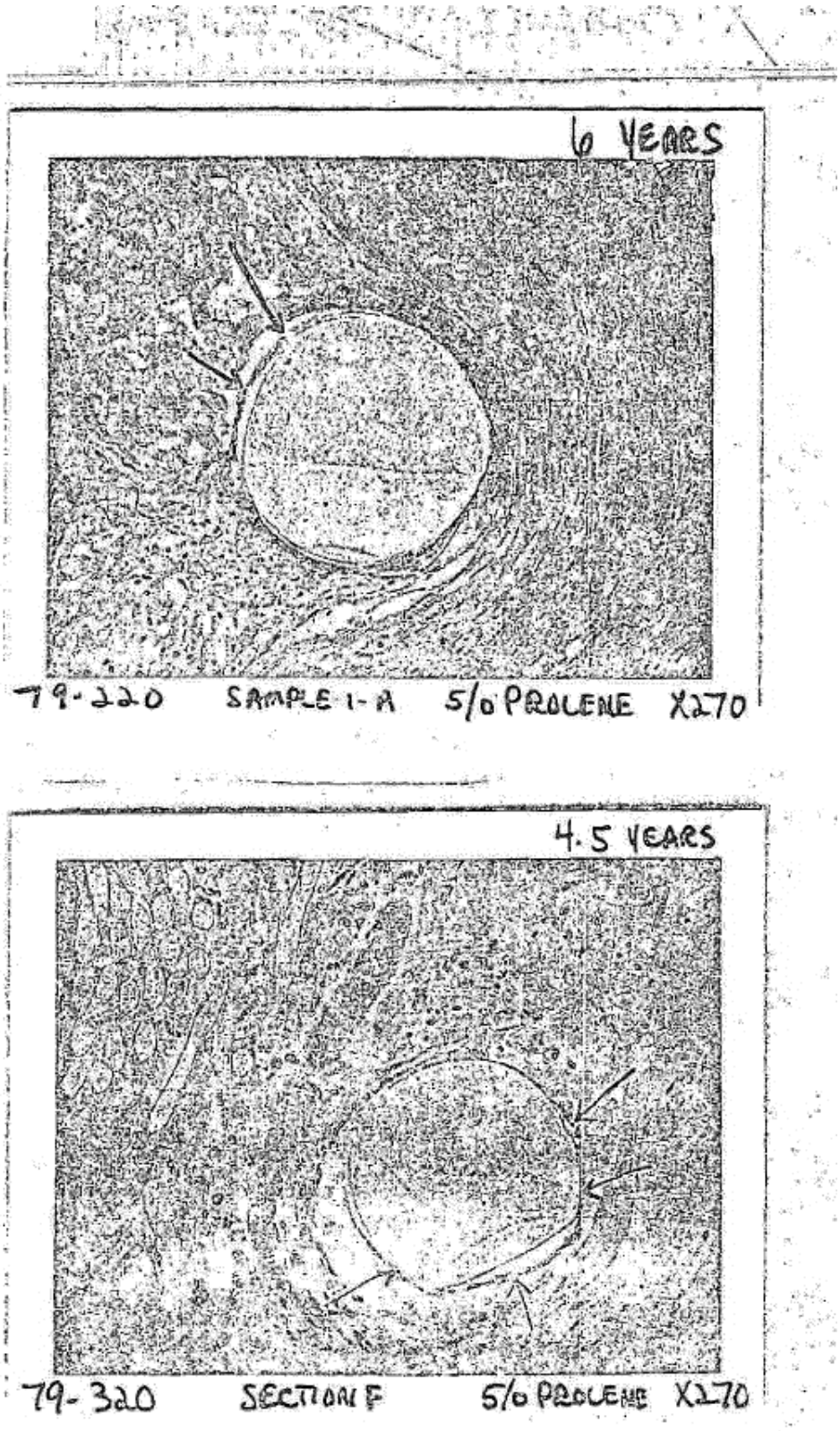


Figure set 19b.

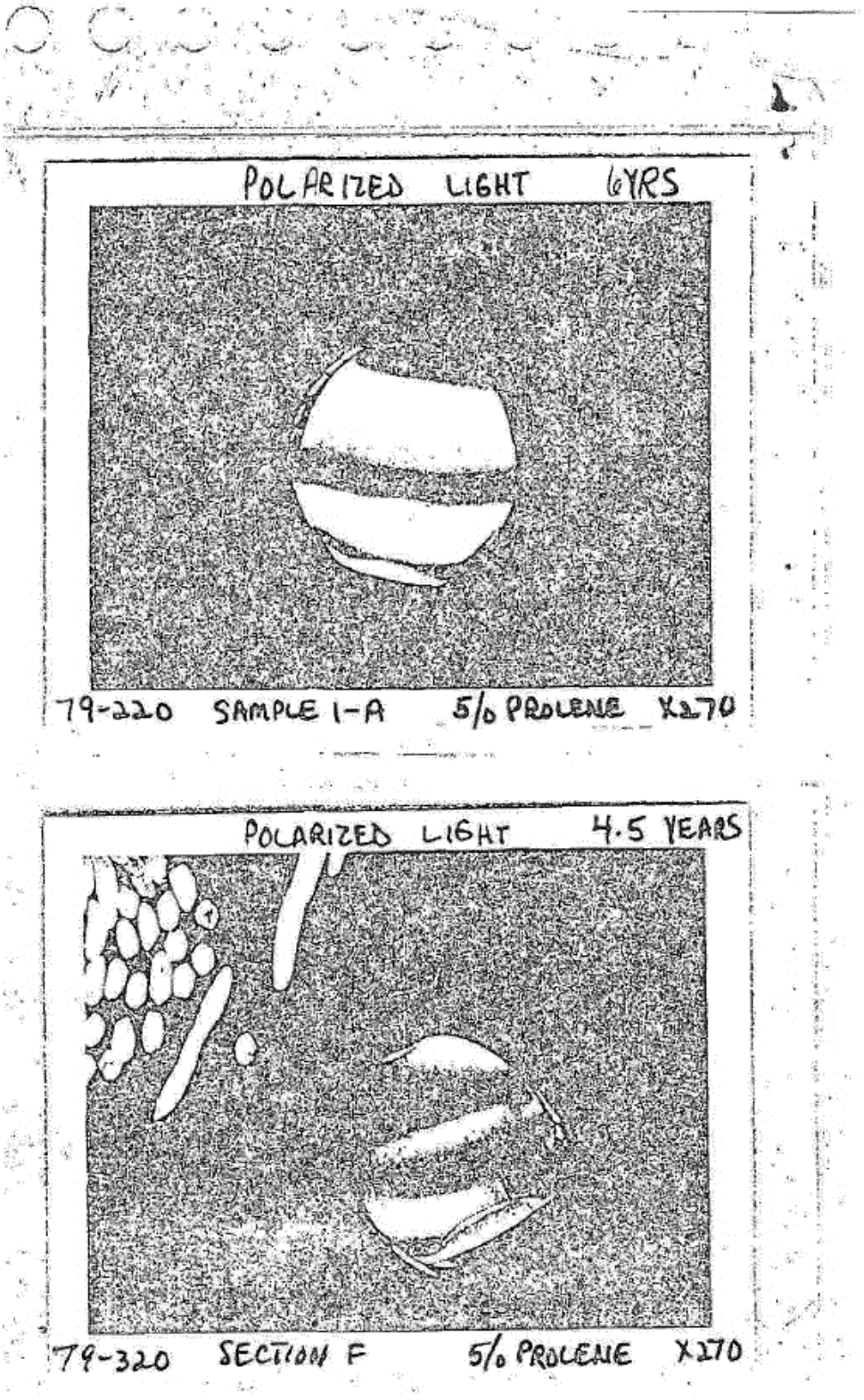




Figure set 19c.

In histological sections of sample 6, a cracked surface layer measuring 3.0-4.5 microns was seen, accounting for approximately 8.5% of the total cross-sectional area. This layer was birefringent when examined under polarized light microscopy. Phloxine stain had completely penetrated the cracked layer, Figure 5, or was confined to the periphery of the surface layer, Figure 6. Particles of blue dye were evident within the cracked layer, Figure 5. There was no evidence of migration of particles from the cracked surface layer into the surrounding tissue.

DISCUSSION

In this study, it was shown that a 5-0 PROLENE suture in residence within a human vascular graft for 7 years displayed surface cracking. Other specimens of size 3-0 and 4-0 in this study from cardiovasular tissue specimens did not show surface cracking. The depth of the cracking in sample #6 was 3.0 - 4.5 microns in thickness which is consistent with other specimens, from previous samples up to 6 years post-op, ERF 84-132. This additional evidence from a 7 year specimen suggests no increase in thickness





of the cracked layer over time. The cracked layer appeared blue in gross specimens and blue dye particles were evident in histological sections of the layer. This would indicate that the layer is dyed PROLENE polymer and not an isolated protein coating on the strands.

Figure set 19d.

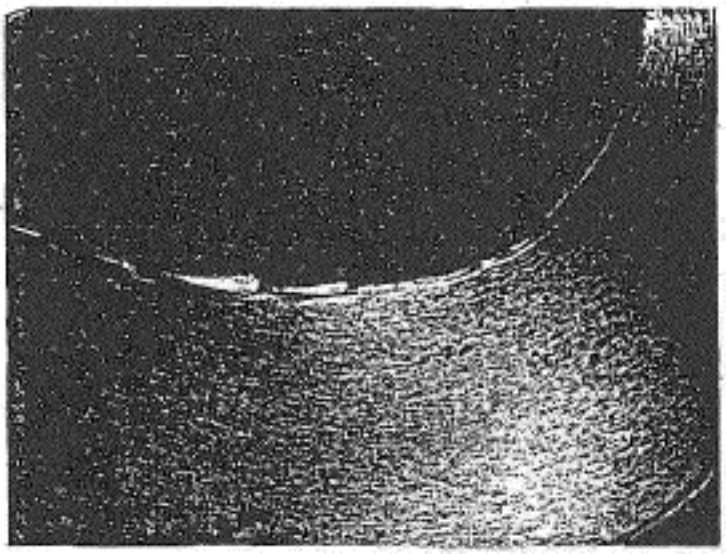

Figure 5 - Histological longitudinal sections of PROLENE from sample 6, block A, Phloxine stained. A 3.0-4.5 micron cracked surface layer is birefringent when viewed with polarized light, magnification x300.

Figure set 19e. Image from the 1983 Ethicon study.

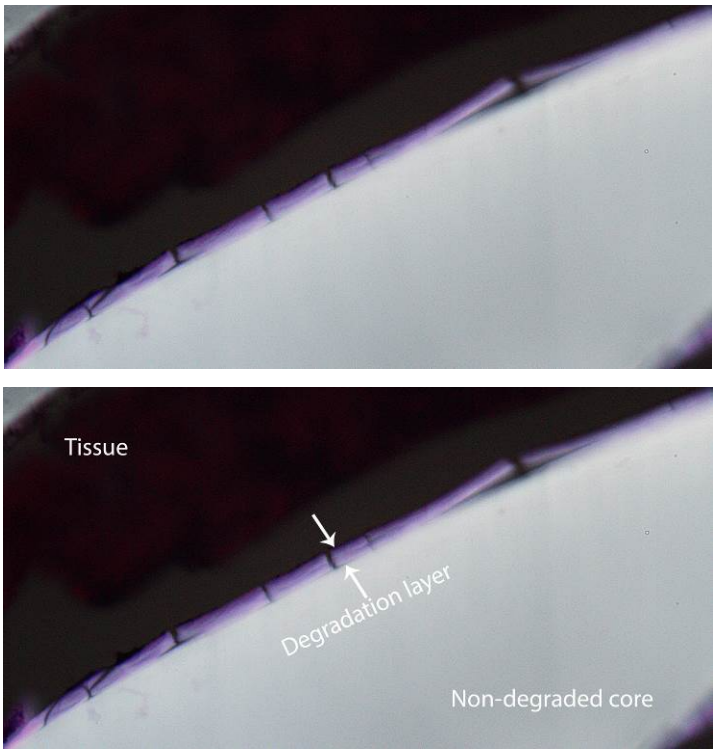


Figure set 19f. Image taken in 2015.

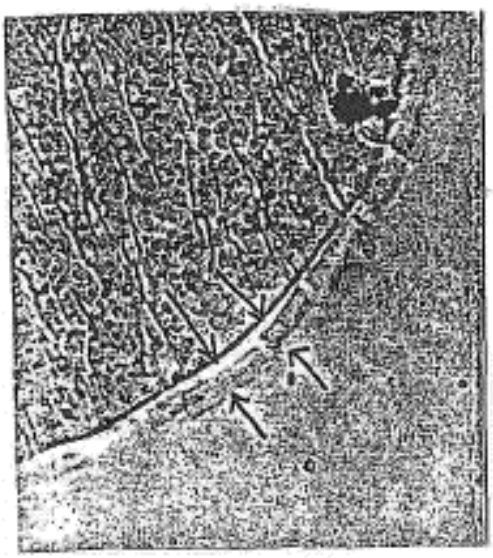

Figure 6 - Histological cross-section of sample 6, block D, Phloxine stained. Pink staining is limited to the periphery of the cracked layer in some areas. Blue dye particles can be seen within the cracked layer, magnification x1100.

Figure set 19g. Image from the 1983 Ethicon study.

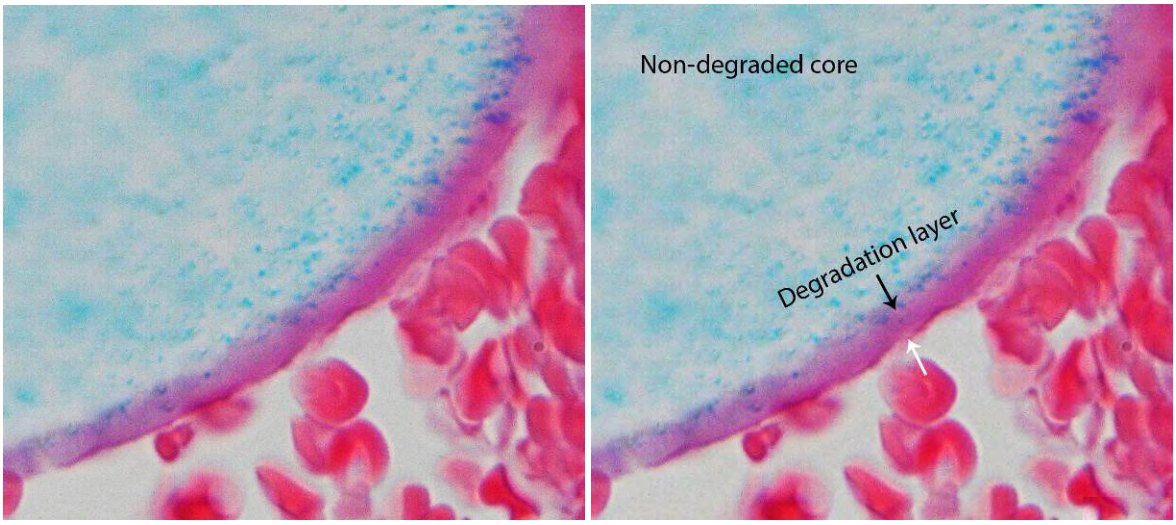


Figure set 19h. Image taken in 2015. Blue dye particles = blue granules; have also been as an internal marker of polypropylene in the 1983 Ethicon study.

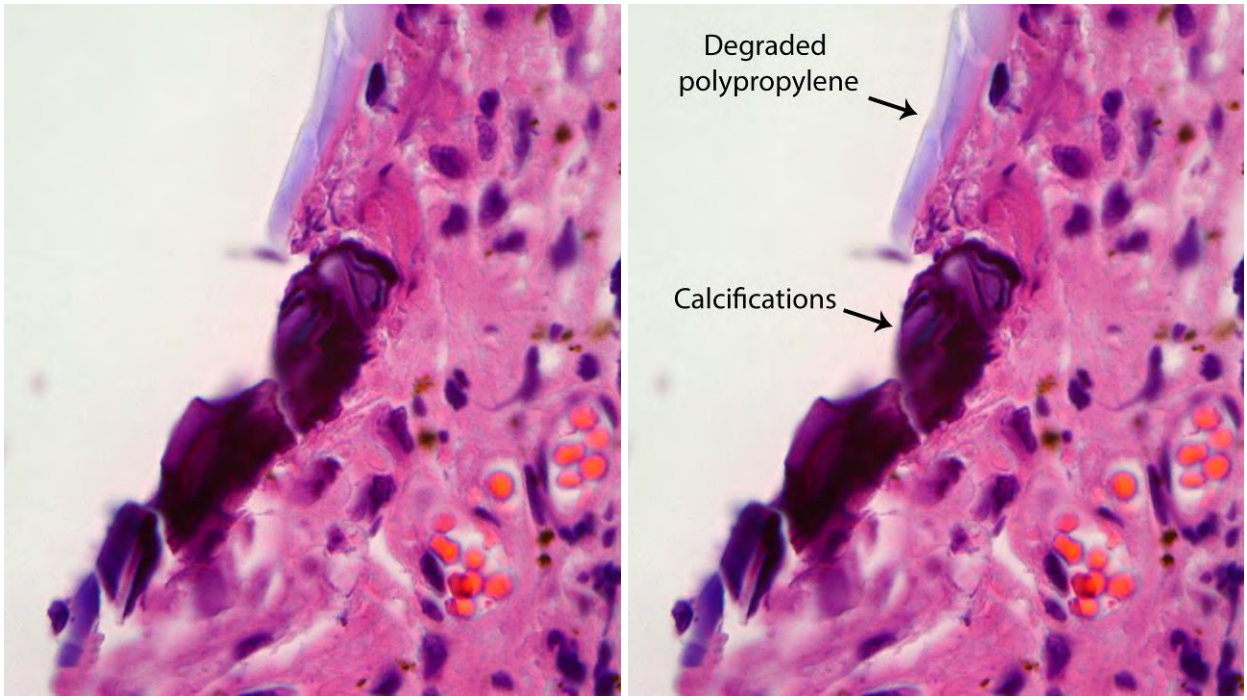


Figure set 20a. Degenerative calcifications triggered by the mesh and the body reaction to it, H&E, x100.

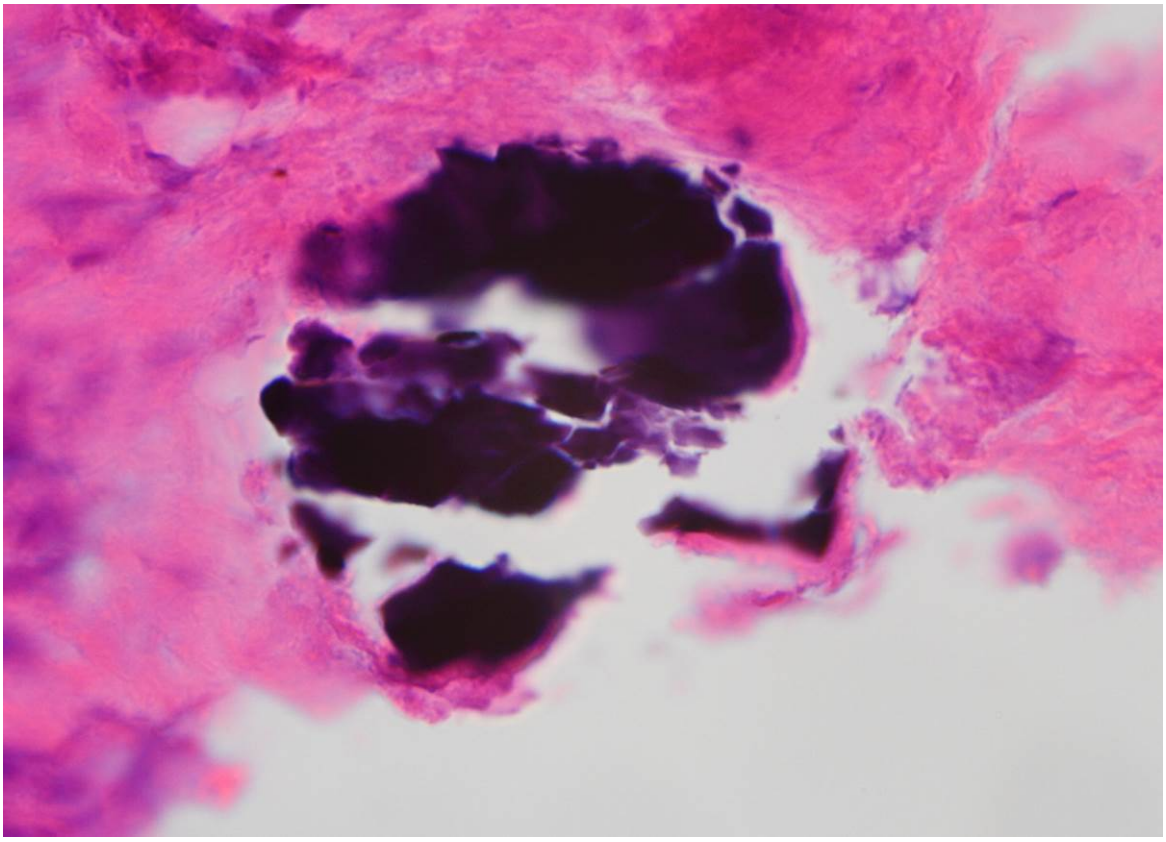

Figure set 20b. Degenerative calcifications triggered by the mesh and the body reaction to it, H&E, x100.In cases wre the mesh migrates into the bladder these calcifications can grow to large bladder stones [589-594].